Washington State Department of Transportation

Project Environmental Mitigation Costs – Case Studies

Fourth Edition

November 2013*

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*Please note: in November some discrepancies were found in the numbers reported in various tables. These discrepancies were fixed and this revised edition published in November 2013.

Contents

Executive Summary

The Washington State Department of Transportation (WSDOT) is committed to maintaining the existing infrastructure and improving the operations and safety of our transportation system. One of the integral parts of our project development and construction program is WSDOT's environmental policy and implementation efforts. As a part of being a good steward of the environment, WSDOT conducts all of its activities in accordance with the most current environmental protection practices. The department also meets or exceeds its commitments by avoiding, minimizing, or appropriately mitigating adverse environmental impacts. Fulfilling these commitments requires considerable effort during all phases of a project, including planning, development, construction, maintenance, and operation of our transportation systems and facilities. Strategic measures are taken in order to integrate the built and natural environments, which protects our state's environmental assets and resources. These measures are the "mitigation" we do to facilitate successful projects and meet our agency's environmental objectives and commitments.

The environmental documentation on our projects (such as an Environmental Impact Statement) communicates to the public and other agencies exactly how impacts will be *avoided, minimized,* and/or *mitigated.* Specific mitigation features and related costs are project specific and vary considerably based on the proposed work and location. Plans for mitigation generally take shape as WSDOT works with other agencies at federal, state, tribal, and local levels to develop specific conditions that projects can incorporate to ameliorate adverse impacts on the environment and other public values. Often, these conditions are expressly written into the project's legally required permits; for example, under the Clean Water Act or the Shoreline Management Act. Permit conditions might include wetland restoration, stormwater runoff treatment and flow control facilities, conservation of historic properties, and noise walls.

Three previous studies were conducted: one in 2003 that evaluated 14 projects, a second in 2006 that evaluated 7, and the third in 2009 that evaluated 14. This 2013 study evaluates another 11 projects and follows that same methodology in its development, including the cost items listed on page 11. Each case study has included one or more projects with features for the specific purpose of avoiding an impact, such as the placement of a retaining wall adjacent to a stream or wetland.

The projects selected for this study are more diverse than those evaluated in prior studies. Specifically, we attempted to include a range of projects that typify WSDOT's "Moving Washington" strategies: operate efficiently, manage demand, and strategically add capacity.

Context Sensitive Solutions are aspects of a project that are included to respond to community concerns and interests. Examples include treatments on retaining walls that mimic or emulate natural or cultural features of the area, different pavement patterns or colors, and unique signs at entrances to communities. They are incorporated into the other associated mitigation categories as applicable. This study attempts to highlight only those Context Sensitive Solutions that were a significant part of the projects' mitigation costs. In addition, temporary

(construction) mitigation efforts are included with the particular mitigation category as applicable. As with the previous studies, this one is intended to quantify the mitigation efforts associated with our highway projects and identify any significant findings.

Environmental mitigation costs on WSDOT highway projects are considered by some to be too costly, while others believe that WSDOT doesn't spend enough on mitigation. This presents the challenge of striking a balance between costs and providing the appropriate amount and type of mitigation. The case studies presented herein illustrate mitigation features provided for specific projects, their costs, and the drivers behind their incorporation into the projects.

Following are some of the key findings from this study:

- The percent of a project's cost spent on mitigation varies greatly with the project type and location.
- Projects west of the Cascade Mountains typically have higher levels of mitigation and related costs.
- 20% of the stormwater mitigation costs for this study are related to temporary mitigation efforts.
- Right of way costs associated with mitigation for this study are a relatively minor portion of the total costs for mitigation.

Methodologies Used in the 2013 Study

Temporary Mitigation

Construction activities can create situations with potential environmental impacts, such as exposed soils during excavation. In order to provide protection during construction, WSDOT implements many types of preventive measures or temporary mitigation. Examples include temporary ponds for water quality treatment and installing products to stabilize loose soil for erosion control. Other measures are less obvious, such as restricting the hours of work to reduce noise impacts. All together, these types of measures are implemented in order to construct our projects while preventing impacts to the environment. The following are some typical items associated with temporary mitigation cost calculations.

Calculation of temporary mitigation costs typically includes, but is not limited to:

- Temporary excavation and embankment
- Silt fence/Wattles/Dikes/Straw/Compost berms
- Water quality monitoring
- Seeding, rockery, and filters
- Pipes and inlets
- Vaults, ponds, and bioswales
- Stream by-pass system
- Air quality (dust prevention)
- Erosion control and planting
- High-visibility fencing
- Additional fencing
- Tire/Wheel wash

Figure 1. Straw used as a temporary mulch to prevent erosion

Stormwater Mitigation

Stormwater runoff can be problematic for streams, wetlands, and other water bodies. To address these issues, WSDOT implements best management practices in order to prevent or reduce potential runoff damage. With recent changes in stormwater management requirements, projects are now incorporating more infiltration and dispersion measures. Some examples include natural and engineered dispersion, compost-amended vegetated filter strips, and media filter drains. Existing highway sections that have no stormwater treatment, or where existing stormwater treatment is substandard, are often improved in conjunction with new highway improvements. Highway stormwater management systems include: providing runoff treatment to meet water quality standards; recharging groundwater; preventing flow erosion; and controlling the rate and duration of storm flows from state right of way. Following are some typical items associated with stormwater management cost calculations.

Calculation of stormwater mitigation costs typically includes, but is not limited to:

- Excavation and embankment
- All bid items associated with stormwater once it leaves the roadway (beyond the edge of pavement)
- All bid items associated with conveyance of stormwater to the treatment facility (beyond the edge of pavement)
- Pipes, inlets, catch basins, and manholes
- Flow spreaders and flow control structures
- Maintenance access roads to facility
- Compost and topsoil
- Seeding and erosion control planting
- Quarry spalls for energy dissipation and outfall protection
- Additional fencing
- Right of way purchase costs associated with stormwater management

In 2010, an appeal settlement modified the 2009 NPDES permit. The settlement required that an additional amount equal to 20% of the cost of treating the new impervious surface in a project be used to retrofit existing pavement within the project, or transfer that money to the stand-alone stormwater retrofit program. This additional expense was not required in any of these projects and therefore was not reflected here.

Wetland Mitigation

When transportation projects create unavoidable wetland impacts, wetlands are enhanced, restored, created, or preserved. Wetland mitigation costs vary based on the type of impact, cost of real estate, and required replacement ratio. Other contributing factors are special conditions or more stringent mitigation ratios required by the local jurisdiction in which the project resides.

Figure 4. Retaining wall being installed on SR 9 to avoid wetland impacts

Wetland avoidance, minimization, and compensatory mitigation costs typically include, but are not limited to:

Any alterations to the roadway design needed to avoid or minimize wetland impacts:

- Retaining walls
- Altered roadway alignment
- Steeper sideslopes
- Guardrail
- Bridges
- Culvert installation

Figure 5. Wetland mitigation site

Any items required to compensate for unavoidable impacts:

- Property acquisition
- Costs constructing wetlands: excavation, grading, soil amendments, plant installation, wildlife habitat structures, etc.
- Site monitoring & management

Any items required as a condition of a wetland permit:

- Removing invasive plants
- Silt fencing or high-visibility fencing

Stream Mitigation

Protection of rivers and streams is critical and can influence the design and construction elements of roadways and bridges. There are multiple types of stream protection actions, including enhancements to the riparian area, or a bridge span over a stream that is wider than the actual width of the stream. For example, if a stream is 10 feet wide and a box culvert of that dimension would sufficiently meet state and federal design standards for carrying stream flow beneath the roadway, but permit conditions require a clear span bridge 50 feet long to protect the other stream habitat functions (such as fish passage, floodplain connectivity, riparian buffers, bedload and woody debris transport, or channel migration), then the cost difference between the culvert and the bridge is a mitigation requirement and would be documented as a mitigation cost. (See Figure 7: Stream mitigation cost analysis.)

Stream mitigation often requires WSDOT to build a structure wider than the actual width of the stream or bigger than what is needed to convey the water from one side of the road to the other. This type of mitigation has many benefits to the environment. It allows the stream to return to more natural stream processes such as allowing the stream to meander and move sediment and woody debris down the stream, provides habitat connectivity, and increases the resilience and reliability of the road.

Figure 6. Bridge installed to provide habitat connectivity

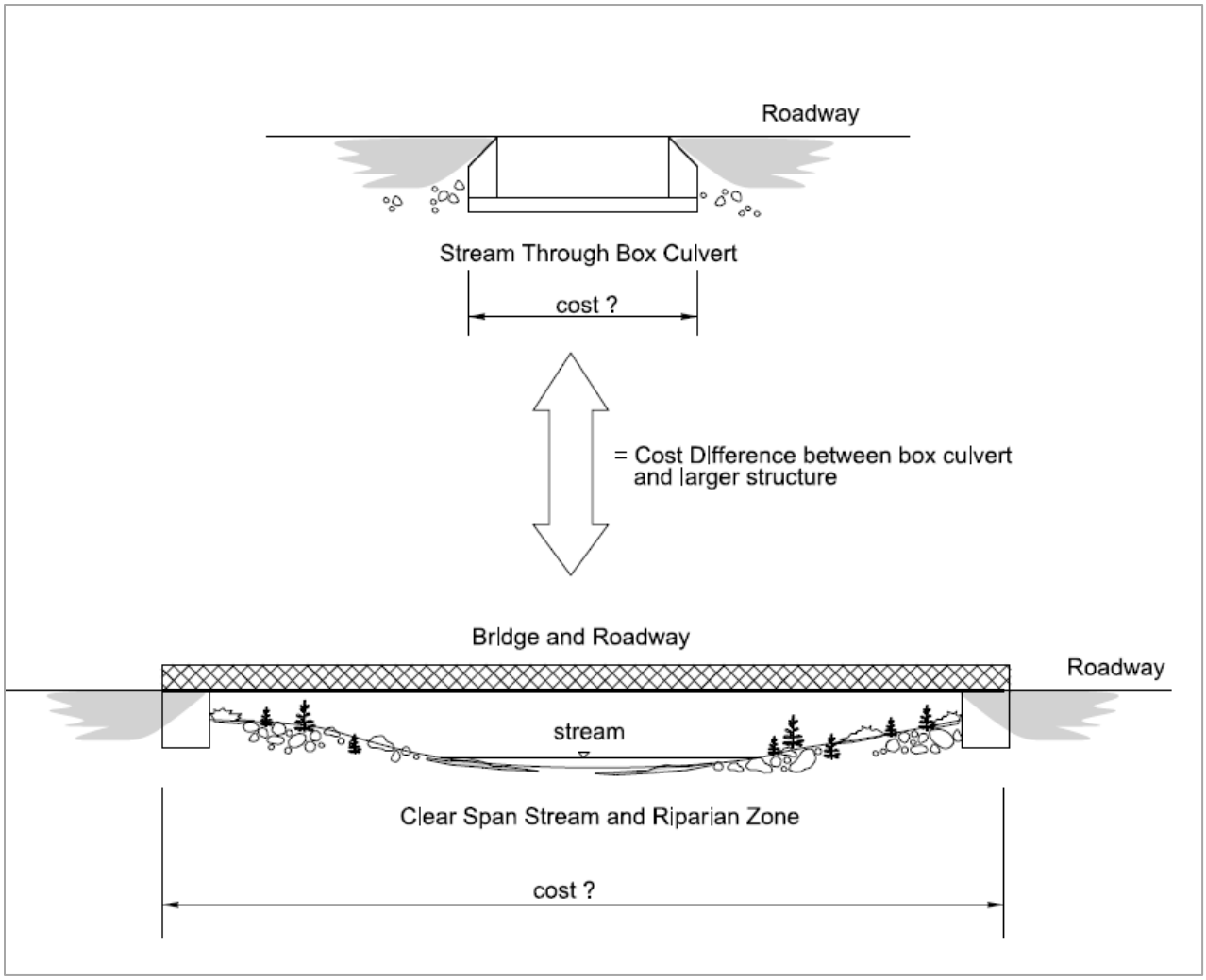


Figure 7: Stream mitigation cost analysis

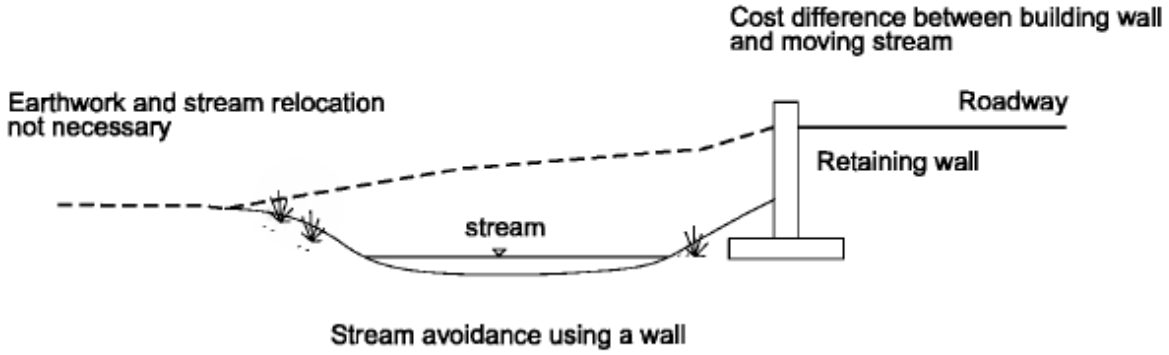


Figure 8: Stream impact avoidance by installing a retaining wall – The difference in cost between normal fill slope construction and moving the wall is the cost of mitigation

Noise Mitigation

Federal law and state policy require that a noise evaluation be done on every project that builds a new road, adds through lanes, or significantly realigns a roadway. Where outdoor noise is expected to reach a lower limit of 66 decibels at "noise sensitive" locations like homes, schools, churches, day care centers, and hospitals, noise mitigation (e.g., walls, earth berms) is evaluated to determine whether it will be meaningful and cost-effective. Noise barriers can reduce traffic noise at residences by as much as one-half, and the cost of noise barriers can vary based on the availability of right of way and the materials used.

Since 1963, WSDOT has built over 91 miles of noise barriers throughout the state and we expect that more barriers will be needed in the future as we continue to build projects in our state's growing urban areas.

Figure 9. Noise barrier wall on SR 18

Noise abatement costs include, but are not be limited to:

- Cost of barriers in place
- Excavation and embankment
- Right of way costs associated with noise barriers
- Concrete foundations and walls
- Clearing and grubbing
- Wall fascia treatments

Context Sensitive Solutions

The National Environmental Policy Act, Intermodal Surface Transportation Efficiency Act, and National Highway System Designation Act of 1995 provide the legislative background for Context Sensitive Solutions. The intent is to: provide flexibility in design; stress the importance of preserving historic and scenic resources; provide transportation enhancement projects that reduce the intrusion of the landscape; be compatible with the existing built and natural environments; and add lasting value to the community.

Achieving context sensitive designs involves a collaborative, interdisciplinary approach requiring stakeholder and public involvement.

Context Sensitive Solution costs include, but are not limited to:

- Providing community gateways
- Providing community connectivity
- Concrete stamping and coloring
- Unique guardrail or railing
- Special landscaping
- Shared-use paths

Figure 10. Context Sensitive Solution treatment on retaining wall on I-82 – Valley Mall interchange

Figure 11. Context Sensitive Solution treatment on retaining wall and bridge columns on SR 395/US 2

Mitigation Feature Costs

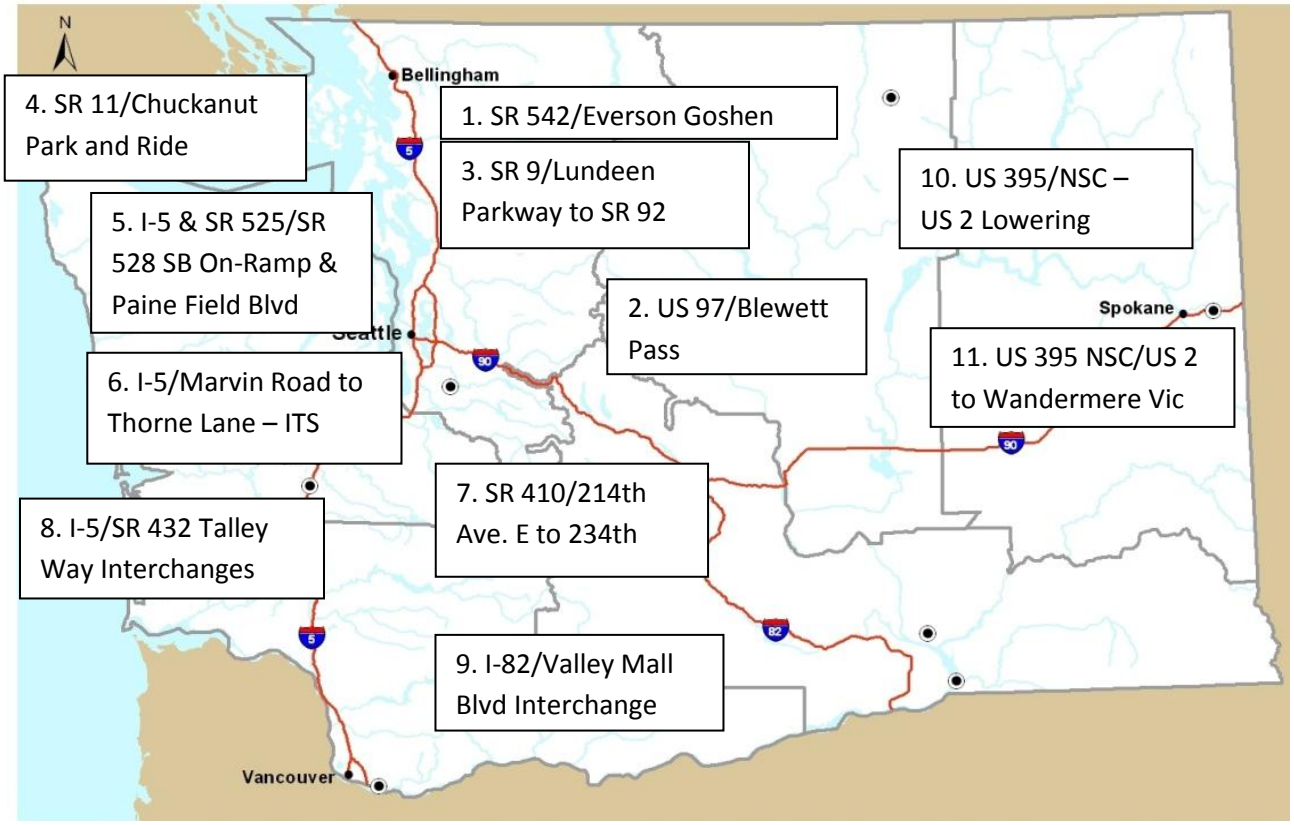
Cost Development

The mitigation feature costs represented in this study are based on bid amounts or actual final mitigation construction costs and include the following:[1]

- Construction cost (actual cost from bid document or contractor payments).
- Allocated share for state sales tax, which is approximately 8% added to the overall construction contract amount.
- Right of way (actual acquisition cost).
- Allocated share of contractor's mobilization, which ranges from 4.5% to 14.7% of the overall construction amount.
- Allocated share of WSDOT's cost for construction engineering and administration adds an amount equal to 8% to 22% of the construction contract amount.
- Allocated share of WSDOT planning and design typically adds an amount equal to 6% to 20% of the overall project costs.
- Temporary mitigation costs are included in the particular mitigation category, as applicable.
- Some of the costs for Context Sensitive Solutions (CSS) are included in the particular mitigation category, as applicable. Only those CSS costs that are a significant portion of the mitigation for a particular project are shown separately.

[1] The costs of processing environmental assessments and permit applications are reflected in the studies, as the data collected includes the expense of preparing environmental documentation. Costs associated with project design selections that are specifically based on avoiding or minimizing environmental impacts are not included.

2013 Project Case Studies



1. **SR 542/Everson Goshen Rd Vicinity – Intersection Improvements**
   Project Cost: **$5.88M**
   Mitigation Types: Stormwater, wetland

2. **US 97/Blewett Pass – Passing Lane**
   Project Cost: **$1.77M**
   Mitigation Type: Stormwater

3. **SR 9/Lundeen Parkway to SR 92 – Add Lanes and Improve Intersections**
   Project Cost: **$17.1M**
   Mitigation Types: Stormwater, wetland, temporary sediment and erosion control

4. **SR 11/Chuckanut Park & Ride – Build Park & Ride**
   Project Cost: **$10.23M**
   Mitigation Type: Stormwater

5. **I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd – Pedestrian Improvements**
   Project Cost: **$0.81M**
   Mitigation Types: Stream, stormwater

6. **I-5/Marvin Road to Thorne Lane – ITS Improvements**
   Project Cost: **$2.5M**
   Mitigation Type: Temporary sediment and erosion control

7. **SR 410/214th Ave E to 234th – Add Lanes**
   Project Cost: **$16.75M**
   Mitigation Types: Stormwater, wetland, stream

8. **I-5/SR 432 Talley Way Interchanges – Rebuild Interchanges**
   Project Cost: **$32.43M**
   Mitigation Types: Stormwater, wetland, stream

9. **I-82/Valley Mall Blvd Interchange – Rebuild Interchange**
   Project Cost: **$29.73M**
   Mitigation Types: Stormwater, wetland, stream, CSS

10. **US 395/NSC – US 2 Lowering – New Alignment**
    Project Cost: **$73.18M**
    Mitigation Types: Stormwater, wetland, stream, noise, CSS

11. **US 395/NSC – US 2 to Wandermere Vicinity – Bridge Construction and Paving**
    Project Cost: **$51.62M**
    Mitigation Types: Stormwater, noise

1. SR 542/Everson Goshen Rd Vicinity – Intersection Improvements

This project built roundabouts at both the Smith Road and Nugents Corner intersections along Mount Baker Highway near Deming. Roundabouts significantly reduce accidents by 40%, injuries by 70%, and fatalities by 90%.

Mitigation Types: Stormwater, wetland, stream

Total Project Cost: $5.88M for 2 new roundabouts

Total Mitigation Costs: $0.92M (15.6% of total project costs)

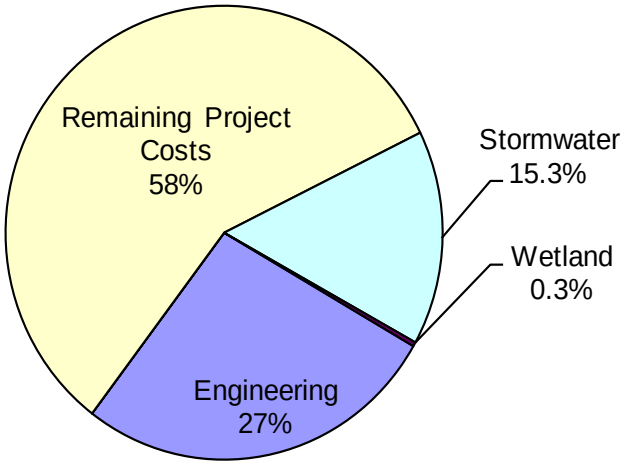
Figure 12. Stream relocation

Figure 13. Stormwater pond

SR 542/Everson Goshen Rd Vicinity – Intersection Improvements					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$906,709	15.3%	Two Separate threshold discharge areas (TDA) at Smith Rd were delineated per design documentation stormwater spreadsheet
Clean Water Act Section 401 Clean Water Act Section 404	Ecology Corps	Wetlands	$17,607	0.3%	Wetland Bank Credits
		Totals	**$924,316**	**15.6%**	

Figure 14. Stormwater conveyance

Cost Breakdown



Phase Costs	
Preliminary Engineering	$1.60M
Wetland Bank Credits	$0.02M
Other Enhancement	$0.81M
Construction	$3.45M
Total	$5.88M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.90M	15.3%
Wetland	$0.02M	0.3%
Total of Mitigation	**$0.92M**	**15.6%**
All Other Items	$4.96M	
Total	**$5.88M**	

2. US 97/Blewett Pass – Passing Lane

This Safety Improvement and Collision Reduction project built a northbound passing lane on US 97, 9 miles south of the Blewett Pass summit near Mineral Springs. Due to its mountainous character, this section of US 97 has had limited safe passing opportunities. Construction began August 9, 2010, and was shut down for winter. Work restarted May 17, 2011, and was completed June 30, 2011.

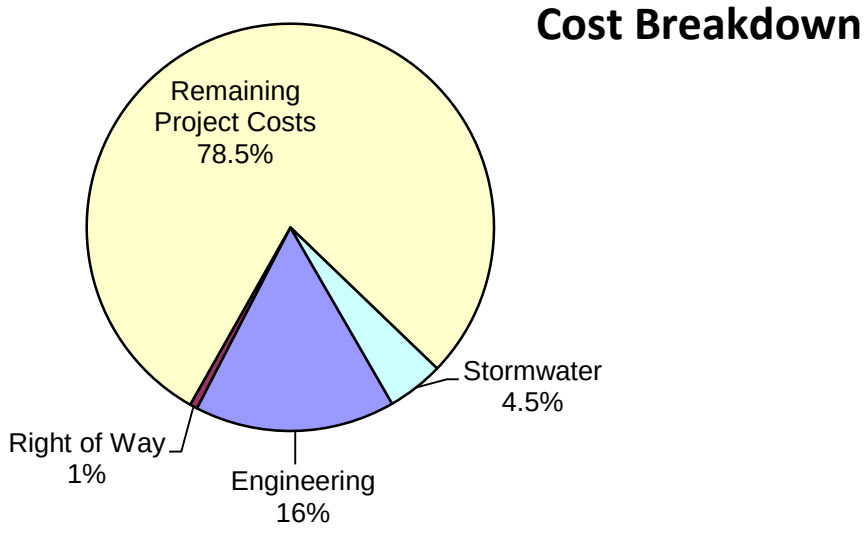
Mitigation Type: Stormwater

Lane Mile Cost Equivalence: Adds 0.9 auxiliary lane miles at $1.97M per lane mile

Total Project Cost: $1.77M for 0.9 new auxiliary lane miles

Total Mitigation Costs: $0.09M per lane mile

US 97/Blewett Pass – Passing Lane					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$79,096	4.5%	
		Totals	**$79,096**	**4.5%**	



Phase Costs	
Preliminary Engineering	$0.28M
R/W,easements	$0.03M
Other Enhancement	$0.28M
Construction	$1.18M
Total	$1.77M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.08M	4.5%
Total of Mitigation	**$0.08M**	**4.5%**
All other Items	$1.69M	
Total	**$1.77M**	

3. SR 9/Lundeen Parkway to SR 92 – Add Lanes and Improve Intersections

This project improved safety and reduced congestion on SR 9 between Lundeen Parkway and SR 92 by adding one lane in each direction and adding turn lanes at two intersections. It also upgraded the traffic signals at three intersections and improved lighting.

Mitigation Types: Stormwater, wetland, temporary sediment and erosion control

Lane Mile Cost Equivalence: Adds two lanes at $8.38M per lane mile

Total Project Cost: $17.1M for 2.03 new lane miles

Cost of Mitigation: $3.80M per lane mile

Figure 15. Retaining wall installed to avoid wetland impacts

The project treated 2.10 acres of impervious surfaces for stormwater runoff impacts and had 1.24 acres of wetland impacts mitigated. However, the biggest part of the mitigation costs were realized in efforts made to avoid wetland impacts. The project was severely constrained by forested wetlands on both sides of the roadway. To avoid impacts to these wetlands, retaining walls were built to minimize fills. The walls required a large amount of geotechnical work as well as structural design work, leading to higher costs.

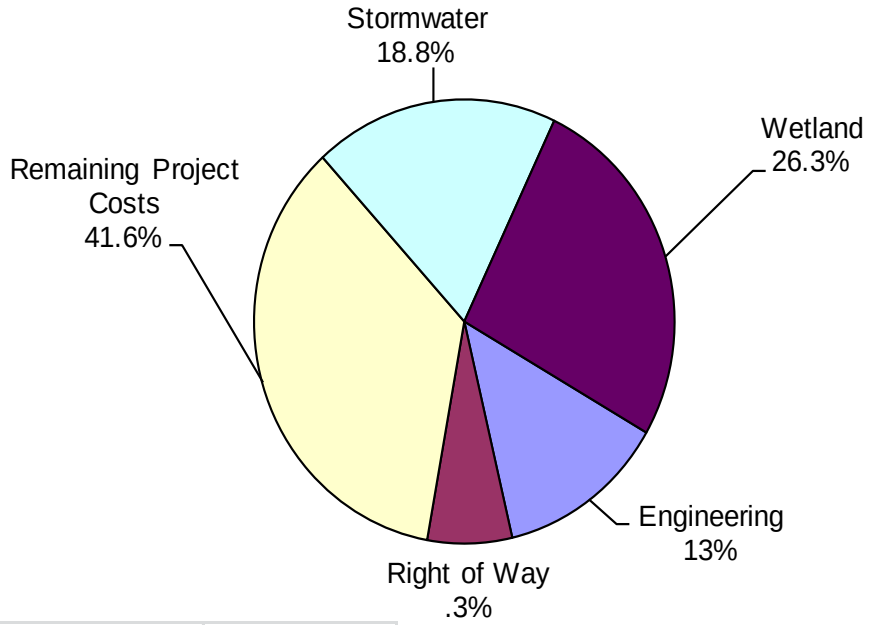
In addition to the retaining walls, this section of roadway is in a low area and a lot of stormwater drains to it. The stormwater had to be treated before being slowly released to the wetlands. This required building a large pad to support concrete stormwater vaults. Temporary erosion and sediment control during construction also added to the mitigation costs for the project. These costs were made higher by the fact that it was wetter than normal during the construction season.

SR 9/Lundeen Parkway to SR 92 – Add Lanes and Improve Intersections					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$3,136,565	18.8%	
Clean Water Act Section 404 Clean Water Act Section 401	Corps Ecology	Wetlands Restoration	$4,501,888	26.3%	Wall used to avoid wetland impacts
Hydraulic Project Approval	WDFW	R/W	$45,375	0.3%	
		Totals	**$7,683,828.00**	**45.40%**	

Figure 16. Construction of pad for stormwater vault

Figure 17. Stormwater vault

Cost Breakdown



Phase Costs	
Preliminary Engineering	$2.21M
Right of Way	$0.05M
Other	$2.74M
Construction	$12.1M
Total	$17.1M

Stormwater	$3.1M	18.8%
Wetland	$4.5M	26.3%
Easements	$0.05M	0.2%
Total of Mitigation	**$7.7M**	**45.3%**
All Other Items	$9.4M	
Total	**$17.1M**	

4. SR 11/Chuckanut Park & Ride – Build Park & Ride

This project built a new park & ride to relieve congestion on I-5, promote carpooling, and tie three transit systems together: Skagit Transit, Island Transit, and the Whatcom Transportation Authority. The new park & ride provides better options and service for commuters. It has 367 parking spaces and a motorcycle parking area.

Construction activities were completed in September 2011.

Mitigation Type: Stormwater

Total Project Cost: $10.23M for the park & ride facility

Total Mitigation Costs: $1.18M

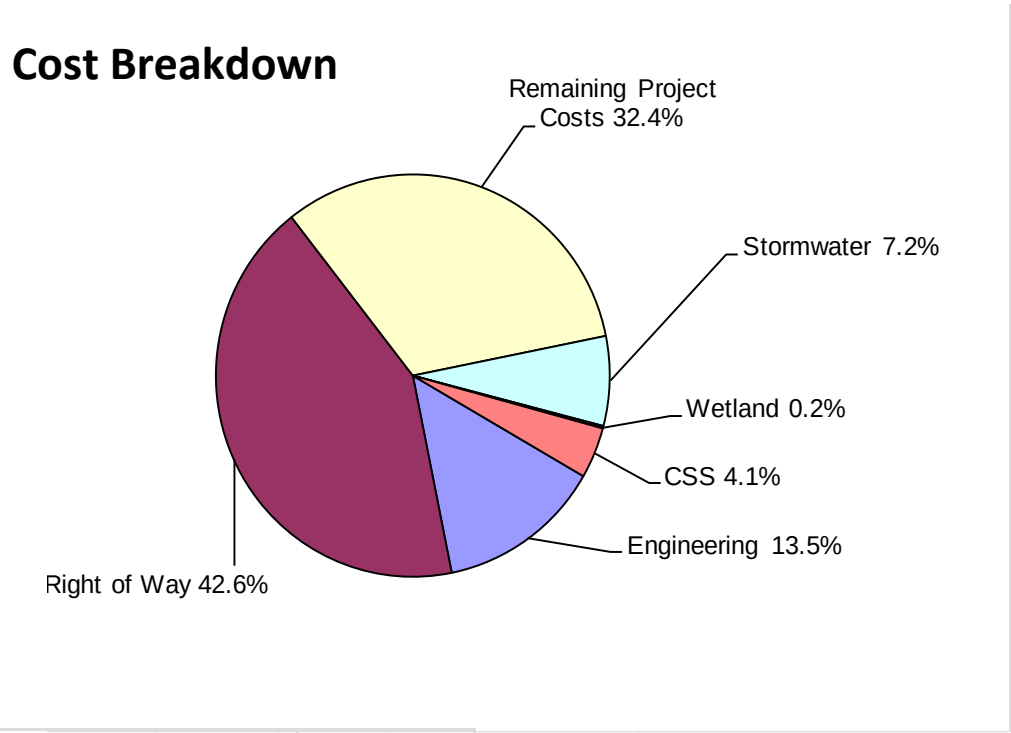
Right of way costs for this project were for the park & ride facility and the access road, not for mitigation purposes.

Figure 18. Aerial view of Skagit Park & Ride site

SR 11/Chuckanut Park & Ride – Build Park & Ride					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$736,846	7.2%	Fee paid to city for stormwater treatment
Clean Water Act Section 404 Clean Water Act Section 401	Corps Ecology	Wetlands Restoration	$21,827	0.2%	
WSDOT Policy		CSS	$423,624	4.1%	
		Totals	**$1,182297**	**11.5%**	

Figure 19. Stormwater treatment pond

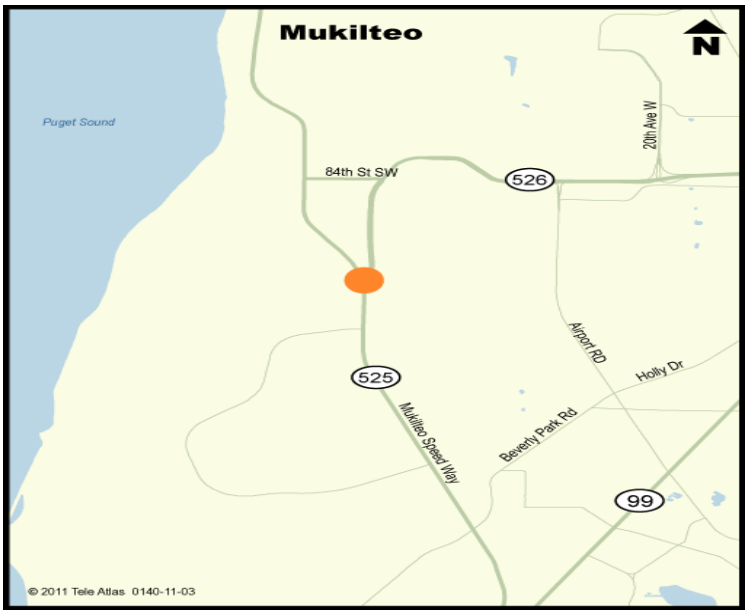
Figure 20. Stormwater treatment facility in foreground



Phase Costs	
Preliminary Engineering	$1.38M
Right of Way, easements, agreements	$4.38M
Construction	$4.47M
Total	$10.23M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.74M	7.2%
Wetland	$0.02M	0.2%
CSS	$0.42M	4.1%
Total of Mitigation cost	**$1.18M**	**11.5%**
All Other Items	$9.05M	
Total	**$10.23M**	

5. I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd – Pedestrian Improvements



The project improved safety at two key locations on SR 525 in Mukilteo and SR 528 in Marysville.

- In Mukilteo, it added a bicycle path across the northbound SR 525 exit to Paine Field Boulevard that connects to the existing bicycle path on the north side of the road.
- In Marysville, the project built a new sidewalk on the ramp from SR 528 to Southbound I-5 and improved sidewalk ramps near the bus shelter.

The I-5/SR 528 Southbound On-Ramp – Sidewalk component of the project entails construction of a 6-foot-wide sidewalk with curb and gutter along the right/outside shoulder of the southbound on-ramp from the beginning of the ramp to the flyer stop bus shelter. The project retrofitted the sidewalk ramp at the southeast corner of the intersection to meet up with the bus stop structure in order to address Americans with Disabilities Act (ADA) compliance issues.

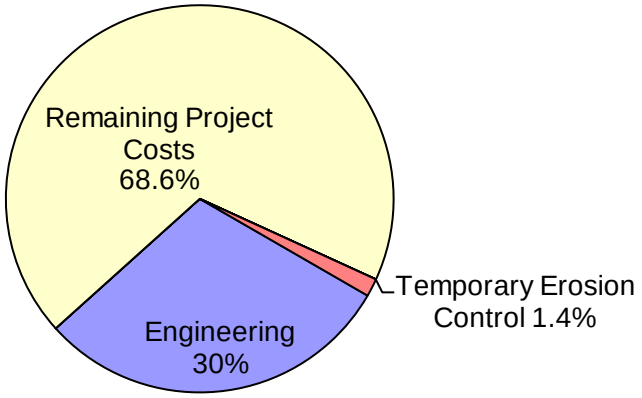
Mitigation Types: Stormwater, stream

Total Project Cost: $0.70M

Total Mitigation Costs: $0.01M (1.4% of the total project cost)

I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Temporary	$12,230	1.4%	
		Totals	**$12,230**	**1.4%**	

Cost Breakdown



Phase Costs	
Preliminary Engineering	$0.21M
Right of Way	
Construction	$0.49M
Total	$0.70M

Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$.01M	1.4%
Total of Mitigation	**$.01M**	**1.4%**
All Other Items	$0.69M	
Total	**$0.70M**	

6. I-5/Marvin Road to Thorne Lane – Intelligent Transportation System Improvements

This section, The Joint Base Lewis-McChord (JBLM) Growth Coordination Plan Transportation Alternatives Analysis and Operational Traffic Model, is a technical study that, along with others, assessed the impacts to I-5, between Mounts Road and SR 512, resulting from the growth of JBLM. The project installed three ramp meters at Marvin Road (SR 510 vicinity), Nisqually, and Mounts Rd. (two of which are outside the limits of the cited study), along with fiber optic cable, closed circuit television cameras, etc., within the project limits. Construction activities began in June 2011 and were completed in May 2012.

Mitigation Types: Temporary erosion and sediment control

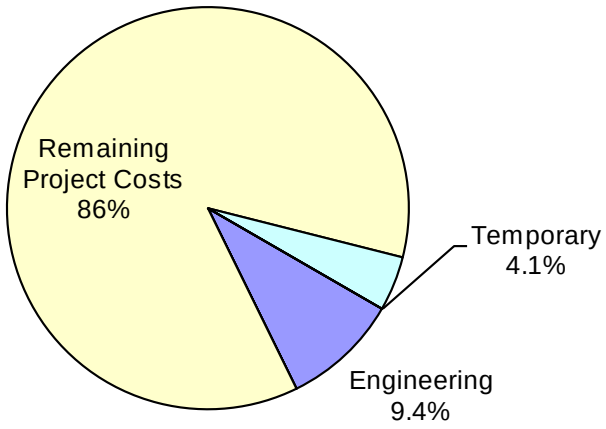
Total Project Cost: $2.50M

Total Mitigation Costs: $0.1M (4.1% of the total project cost)

Figure 22. Earthwork with silt fence in background

I-5/Marvin Road to Thorne Lane – ITS Improvements					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater (Temporary)	$103,646	4.1%	
		Totals	**$103,646**	**4.1%**	

Cost Breakdown



Phase Costs	
Preliminary Engineering	$0.23M
Construction	$2.27M
Total	$2.50M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.10M	4.1%
Total of Mitigation	**$0.10M**	**4.1%**
All Other Items	$2.39M	
Total	**$2.50M**	

7. SR 410/214th Ave E to 234th – Add Lanes

The current traffic volumes on SR 410 surpass the capacity of a two-lane roadway, reducing mobility and safety. The area around Bonney Lake and east Pierce County has developed tremendously in the last 10 years, and SR 410 is feeling the effects of this development. This 1.49-mile project added one lane in each direction of SR 410 (MP 15.61 to 17.10), with a raised median separating the eastbound and westbound traffic between 214th and 234th avenues.

Mitigation Types: Stormwater, wetland, stream, temporary erosion and sediment control

Lane Mile Cost Equivalence: Widens to four lanes at $5.62M per lane mile

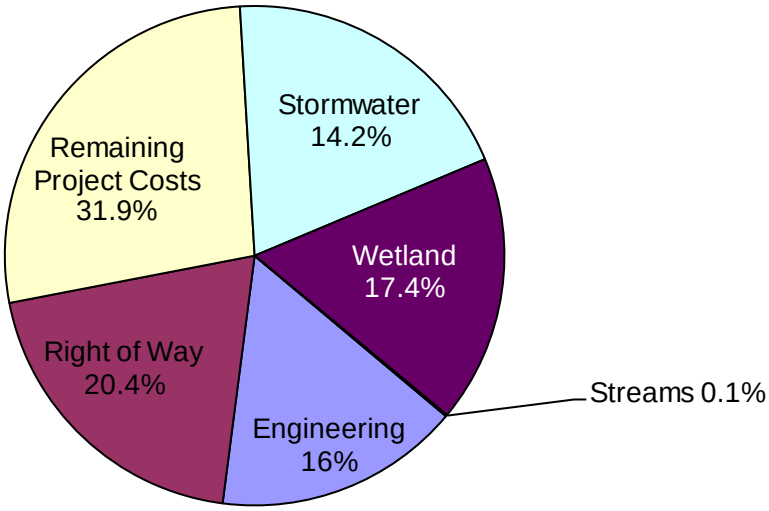
Total Project Cost: $16.75M for 2.98 new lane miles

Figure 24. Stormwater pond

SR 410/214th Ave E to 234th – Add Lanes					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$2.38M	14.2%	Includes cost for additional R-O-W
Clean Water Act Section 401 Clean Water Act Section 404 Hydraulic Project Approval	Ecology Corps WDFW	Stream	$.02M	0.1%	
Clean Water Act Section 404	Corps	Wetland	$2.92M	17.4%	Post-construction monitoring & plant establishment for a period of 10 years (estimate in excess of $0.5 million), including R-O-W
		Totals	**$5.32M**	**31.7%**	

Figure 25. Stream restoration

Cost Breakdown



Phase Costs	
Preliminary Engineering	$2.70M
Post Construction	$0.52M
Right of Way	$3.43M
Construction	$10.10M
Total	$16.75M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$2.38M	14.2%
Stream	$0.02M	0.1%
Wetland	$2.92M	17.4%
Total of Mitigation	**$5.32M**	**31.7%**
All Other Items	$11.43M	
Total	**$16.75M**	

8. I-5/SR 432 Talley Way Interchanges – Rebuild Interchanges

This project improved the I-5 interchange at SR 432 (Exit 36), and the adjacent SR 432 interchange at Talley Way. The new interchanges eliminate weaving conditions, create better connections to existing roads, increase capacity, and decrease congestion. The project began construction in spring 2010 and was completed in fall 2011.

The SR 432 interchanges at I-5 and Talley Way are in close proximity to each other, which caused traffic to back up as cars and trucks merged back and forth between them. This project improves the interconnectivity of these interchanges and helps reduce congestion problems. The project treated 24.3 acres of impervious surfaces with stormwater BMPs, and mitigated 3.37 acres of wetland impacts.

Mitigation Types: Stormwater, wetland

Total Project Cost: $32.4M

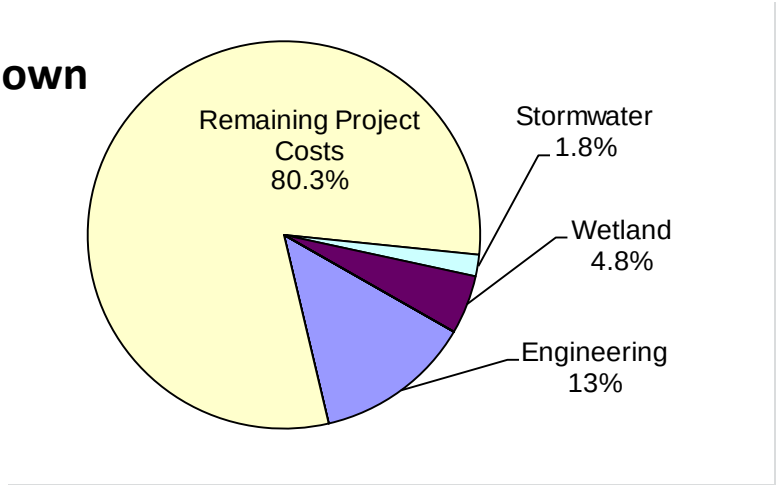
Total Mitigation Costs: $2.14M (7.8% of the total project cost)

Figure 26. Stormwater pond

Figure 27. Wetland mitigation site

I-5/SR 432 Talley Way Interchanges – Rebuild Interchanges					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$574,797	1.8%	
Clean Water Act Section 404 Clean Water Act Section 401	Corps Ecology	Wetland	$1,561,440	4.9%	Includes $0.48 R-O-W cost
		Totals	**$2,136,237**	**6.7%**	

Cost Breakdown



Phase Costs	
Preliminary Engineering	$4.2M
Construction	$28.2M
Total	$32.4M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$.57M	1.8%
Wetland	$1.56M	4.8%
Total of Mitigation	**$2.13M**	**6.6%**
All Other Items	$30.23M	
Total	**$32.4M**	

9. I-82/Valley Mall Blvd Interchange – Rebuild Interchange

This interchange provides access to and from I-82 for Union Gap and Yakima. WSDOT updated and improved the interchange in order to provide additional capacity, free up movement on and off the Interstate, and connect smoothly with the expanding local road system.

Mitigation Types: Stormwater, wetland, stream, CSS

Total Project Cost: $29.7M

Total Mitigation Costs: $2.8M (9.5% of the total project cost)

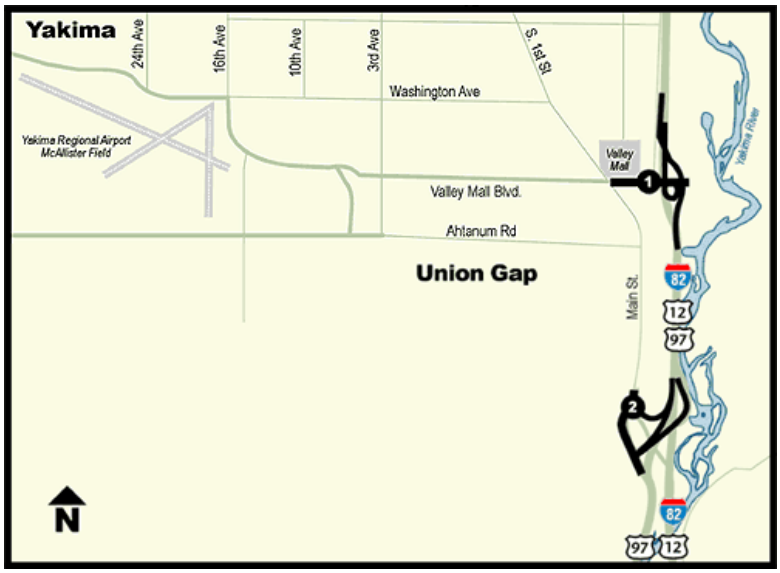
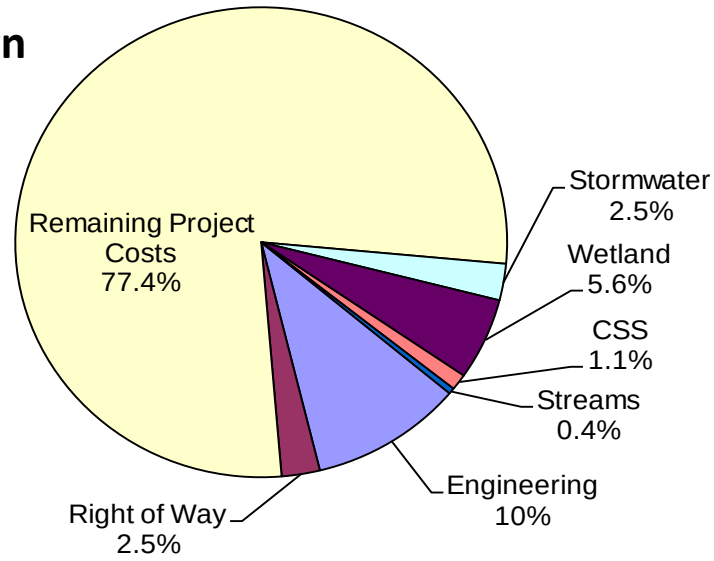


Figure 28. Valley Mall Blvd interchange

Figure 29. Entrance sign to Union Gap (CSS)

I-82/Valley Mall Blvd Interchange – Rebuild Interchange					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$686,550	2.5%	The project treated 5.3 acres of impervious surfaces
Clean Water Act Section 404 Clean Water Act Section 401	Corps Ecology	Wetlands Restoration	$1,676,212	5.6%	ROW acquisition for the wetland totaled $4.10M
Clean Water Act Section 402 Hydraulic Project Approval	Ecology WDFW	Stream Protection	$106,072	1%	
		CSS	$326,774	1%	
		Totals	**$2,795,608**	**9.5%**	

Cost Breakdown



Phase Costs	
Preliminary Engineering	$3.1M
Right of Way	$.73M
Construction	$25.9M
Total	$29.7M

Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.69M	2.5%
Wetland	$1.67M	5.6%
Stream	$0.11M	0.4%
CSS	$0.33M	1.0%
Total of Mitigation	**$2.80M**	**9.5%**
All Other Items	$26.9M	
Total	**$29.7M**	

10. US 395/NSC – US 2 Lowering – New Alignment

This contract lowered US 2 between Farwell Road and Deadman Creek, constructed six bridges and multiple retaining walls for the NSC/US 2 Interchange, and completed the mainline paving through the interchange. The contract also included the construction of a frontage road system along US 2.

The project treated 13.4 acres of impervious surfaces for stormwater impacts and 0.37 acres of wetland impacts.

Mitigation Types: Stormwater, wetland, stream, noise, CSS

Total Project Cost: $60.4M

Total Mitigation Costs: $8.4M (13.9% of the total project cost)

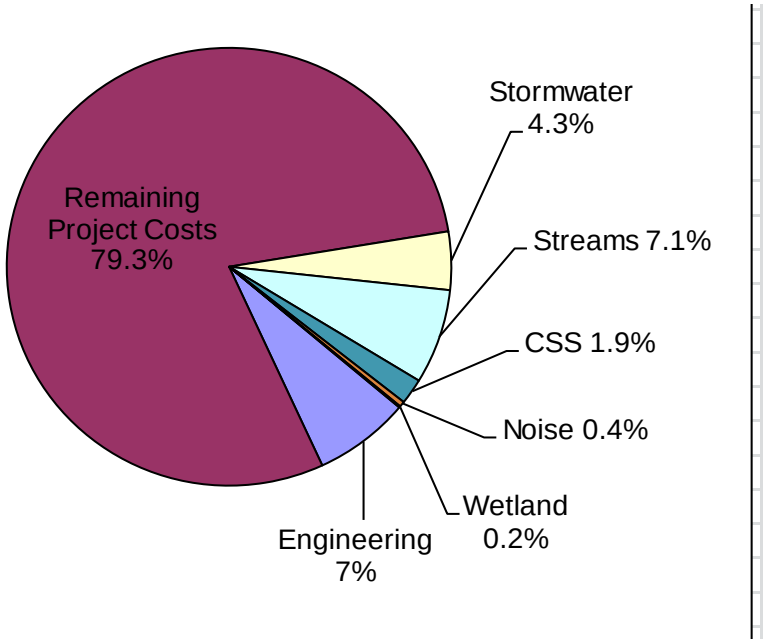
Figure 30. Wall panels with context sensitive texture treatment

Figure 31. Culvert for stream and habitat connectivity

US 395/NSC – US 2 Lowering					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$2.6M	4.3%	Primarily used ecology embankment, pond, and erosion control plantings to treat 13.4 acres of impervious surface
Clean Water Act Section 404 Clean Water Act Section 401	Corps Ecology	Wetland	$0.12M	0.2%	Purchased wetland bank credits for 0.37 acres of impacts
Clean Water Act Section 401 Clean Water Act Section 402 Hydraulic Project Approval	Ecology Ecology WDFW	Stream Protection	$4.3M	7.1%	Structural earth wall for impact avoidance in addition to stream enhancements
FHWA Noise Abatement Criteria	FHWA	Noise	$0.26M	0.4%	
WSDOT Policy		CSS	$1.15M	1.9%	
		Total	**$8.4M**	**13.9%**	

Figure 32. Deer moving through culvert (image caught by monitoring camera)

Cost Breakdown

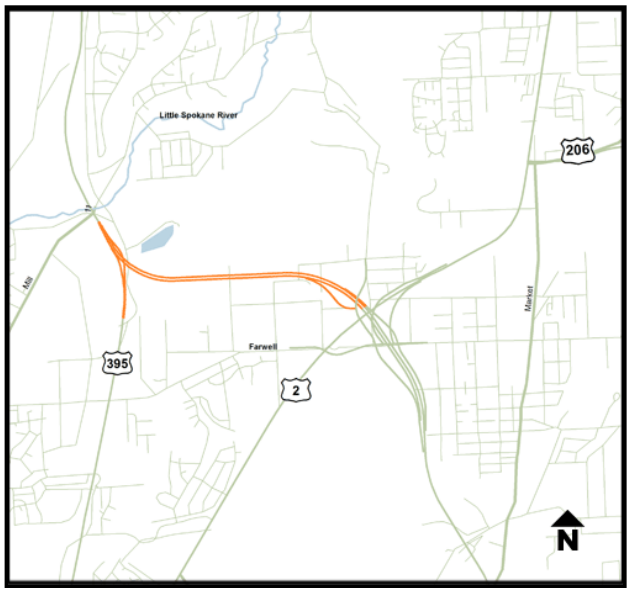


Preliminary Engineering	$4.27M
Wetland Bank/Port Project	$0.12M
Construction	$56.00M
Total	$60.4M

Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$2.57M	4.3%
Wetland	$0.12M	0.2%
Stream	4.3M	7.1%
CSS	$1.15M	1.9%
Noise	$0.26M	0.4%
Total of Mitigation	**$8.4M**	**13.9%**
All Other Items	$55.0M	
Total	**$60.4M**	

11. US 395 NSC/US 2 to Wandermere Vicinity – Bridge Construction and Paving

This contract completed the paving on four lanes of freeway between Farwell Road and existing US 395 at Wandermere. Two bridges were constructed to span the final gap at the north end of the route.



Mitigation Types: Stormwater, noise, CSS

Total Project Cost: $51.6M

Mitigation Costs: $1.9M (3.7% of the total project cost)

Project Added: 6.72 lane miles at $7.69M per lane mile

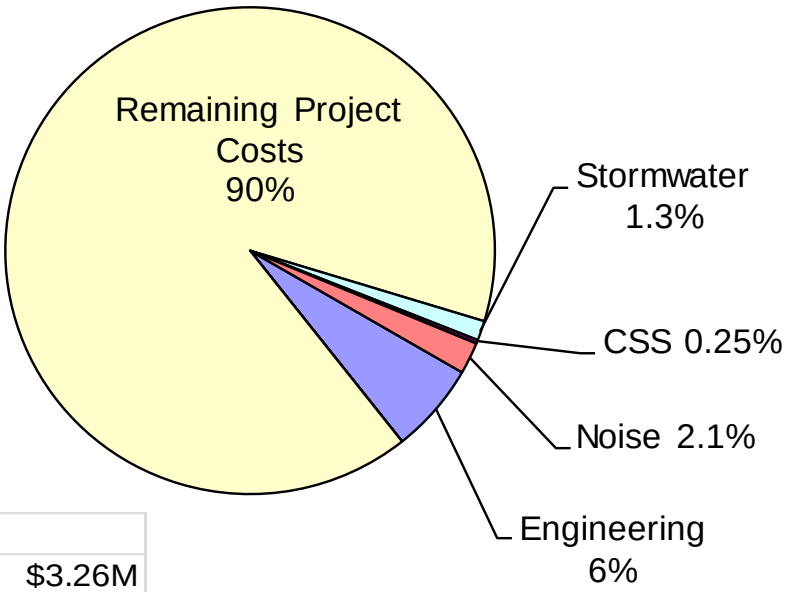
Total Mitigation Costs: $0.28M per lane mile

Figure 33. Completed project

Figure 34. Temporary erosion control

US 395/NSC – US 2 to Wandermere Vicinity					
Significant Mitigation Drivers	**Agency**	**Mitigation Categories**	**Mitigation Cost**	**% of Project Cost**	**Mitigation Comments**
Clean Water Act Section 402	Ecology	Stormwater Facilities	$0.65M	0.13%	
HWA Noise Abatement Criteria	FHWA	Noise	$1.1M	2.0%	
WSDOT Policy		CSS	$0.13M	0.25%	
		Total	**$1.9M**	**3.7%**	

Cost Breakdown



Phase Costs	
Preliminary Engineering	$3.26M
Wetland Bank/Port Project	
Construction	$48.37M
Total	$51.63M

Mitigation Costs		
Mitigation Elements	**Total Mitigation Cost**	**% of Total Project Cost**
Stormwater	$0.65M	1.30%
Noise	$1.1M	2.0%
CSS	$0.13M	0.3%
Total of Mitigation	**$1.9M**	**3.7%**
All Other Items	$49.73M	
Total	**$51.63M**	

Mitigation Summary Table

Table 1. Summary of mitigation costs per project – Costs shown in millions of dollars

Project	Total Project Cost[2]	Storm-water	Noise	Wetland	Streams	CSS	Total Mitiga-tion Cost	% of Project Cost
SR 542/Everson Goshen Rd. Vic	$5.88	$0.90	0	$0.02	0	0	$0.92	15.6%
US 97/Blewett Pass	$1.77	$0.08	0	0	0	0	$0.08	4.5%
SR 9/Lundeen Parkway to SR 92	$17.1	$3.20	0	$4.50	0	0	$7.75	45.3%
SR 11/ Chuckanut Park & Ride	$10.23	$0.74	0	$0.02	0	$0.42	$1.18	11.5%
I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd	$0.81	$0.01	0	0	0	0	$0.01	1.4%
I-5/Marvin Road to Thorne Lane – ITS Improvements	$2.5	$0.11	0	0	0	0	$0.11	4.1%
SR 410/214th Ave E to 234th	$16.75	$2.38	0	$2.92	$0.02	0	$5.31	31.7%
I-5/SR 432 Talley Way Interchanges	$32.43	$0.57	0	$1.56	0	0	$2.14	6.6%
I-82/Valley Mall Blvd Interchange	$29.73	$0.69	0	$1.63	$0.11	$0.33	$2.8	9.5%
US 395/NSC – US 2 Lowering	$60.4	$2.57	$0.26	$0.12	$4.30	$1.15	$8.4	13.9%
US 395/NSC – US 2 to Wandermere Vicinity	$51.62	$0.65	$1.10	0	0	$0.13	$1.90	3.7%
Totals	**$242**	**$ 12.76**	**$1.4**	**$14.6**	**$2.6**	**$0.4**	**$32.21**	

[2] Dollars in millions typical.

Mitigation Summary Chart

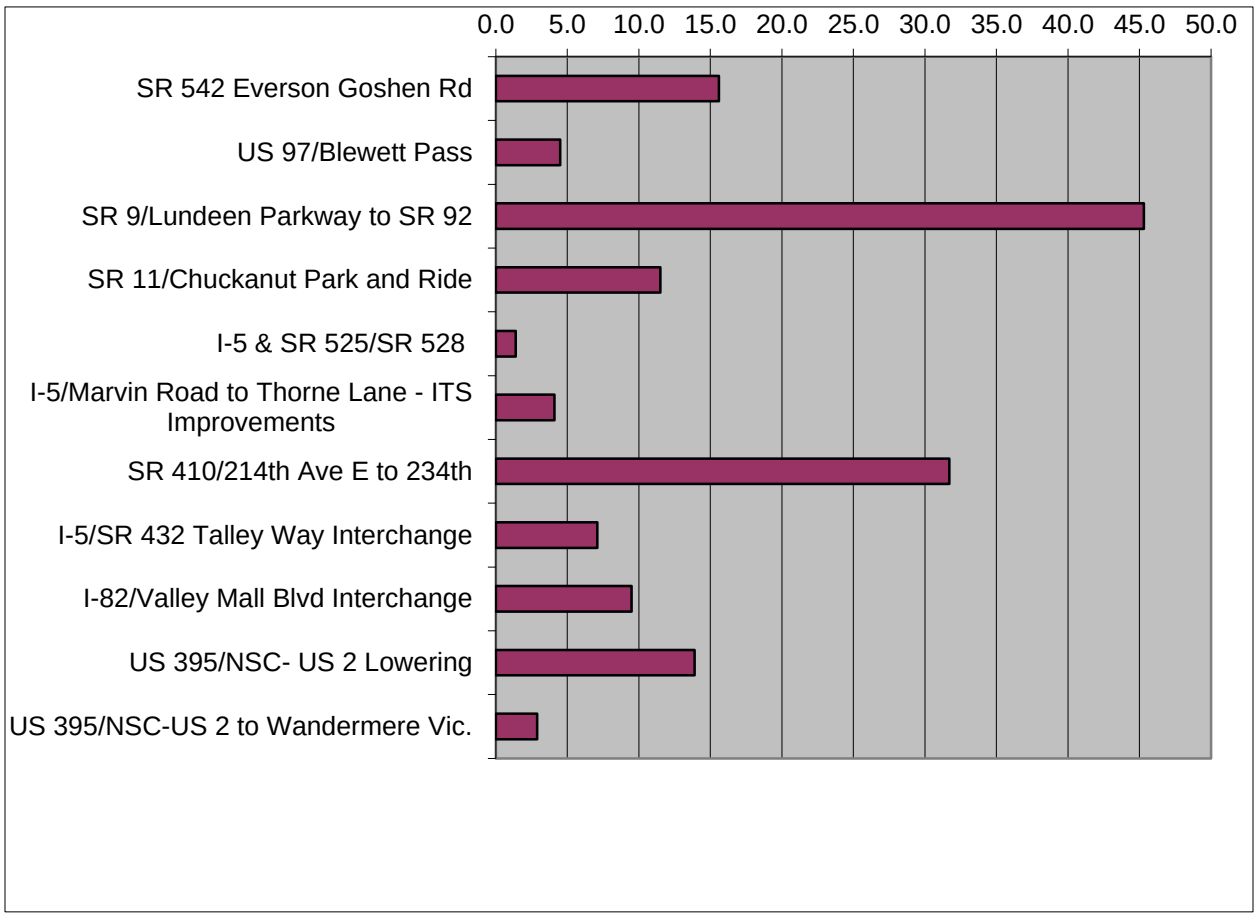


Figure 35. Mitigation costs shown as a percentage of total project costs

Cross-State Comparison

Table 2. West side projects – Costs shown in millions of dollars

West Side Projects	Total Project Cost	Storm-water	Noise	Wetland	Streams	CSS	Total Mitiga-tion Cost	% of Project Cost
SR 542/Everson Goshen Rd Vic	$5.88	$0.90	0	$0.02	0	0	$0.92	15.6%
SR 9/Lundeen Parkway to SR 92	$17.1	$3.20	0	$4.50	0	0	$7.70	45.3%
SR 11/Chuckanut Park & Ride	$10.23	$0.74	0	$0.02	0	$0.42	$1.18	11.5%
I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd	$0.81	$0.01	0	0	0	0	$0.01	1.4%
I-5/Marvin Road to Thorne Lane – ITS Improvements	$2.5	$0.11	0	0	0	0	0.11	4.1%
SR 410/214th Ave E to 234th	$16.75	$2.38	0	$2.92	$0.02	0	$5.31	31.7%
I-5/SR 432 Talley Way Interchanges	$32.43	$0.57	0	$1.56	0	0	$2.48	7.1%
Totals	**$85.70**	**$7.91**	**0**	**$9.02**	**$0.2**	**$0.42**	**$17.71**	**20.1%**

Table 3. East side projects – Costs shown in millions of dollars

East Side Projects	Total Project Cost	Storm-water	Noise	Wetland	Streams	CSS	Total Mitigation Cost	% of Project Cost
US 97/ Blewett Pass	$1.77	$0.17	0	0	0	0	$0.17	4.5%
I-82/Valley Mall Blvd Interchange	$29.73	$0.79	0	$1.65	$0.11	$0.33	$2.8	9.5%
US 395/NSC – US 2 Lowering	$60.4	$2.57	$0.26	$0.12	$4.3	$1.15	$8.4	13.9%
US 395/ NSC – US 2 to Wandermere Vicinity	$51.62	$0.65	$1.10	0	0	$0.13	$1.90	3.7%
Totals	**$143.52**	**$4.18**	**$1.36**	**$1.77**	**$4.41**	**$1.61**	**$13.27**	**9.29%**

Table 4. Cross-state project mitigation ranges in percent of project costs

Project Mitigation Cost Ranges	East		West	
	Low	High	Low	High
Total Mitigation	**3.70%**	**13.9%**	**1.40%**	**45.30%**
Stormwater	0.13%	4.50%	1.40%	18.80%
Wetlands	0.10%	5.18%	0.20%	26.30%
Streams	0.10%	7.12%	0.10%	9.90%
Noise	0.40%	2.13%	0.00%	0.00%
CSS	0.10%	1.90%	0.00%	4.10%

Case Studies: 2013, 2009, 2006, and 2003

Table 5. 2013 project and mitigation cost summary – Costs shown in millions of dollars

2013 Case Studies	Total Project Cost	Total Mitigation Costs	% of Project Cost Spent
SR 542/Everson Goshen Rd Vicinity	$5.88	$0.92	15.6%
US 97/Blewett Pass	$1.77	$0.08	4.5%
SR 9/Lundeen Parkway to SR 92	$17.1	$7.75	45.1%
SR 11/Chuckanut Park & Ride	$10.23	$1.18	11.5%
I-5 & SR 525/SR 528 SB On-Ramp & Paine Field Blvd	$0.81	$.01	1.4%
I-5/Marvin Road to Thorne Lane – ITS Improvements	$2.5	$.11	4.1%
SR 410/214th Ave E to 234th	$16.75	$5.31	31.7%
I-5/SR 432 Talley Way Interchanges	$32.43	$2.48	7.8%
I-82/Valley Mall Blvd Interchange	$29.73	$2.80	9.5%
US 395/NSC – US 2 Lowering	$60.4	$8.4	13.9%
US 395/NSC – US 2 to Wandermere Vicinity	$51.62	$1.90	3.7%
Totals	**$242**	**$34.12**	

Table 6. 2009 project and mitigation cost summary – Costs shown in millions of dollars

2009 Case Studies	Total Project Cost in Millions	Total Mitigation Costs in Millions	% of Project Cost Spent on Mitigation
SR16 Burley Olalla I/C	$24.1	$4.59	19.1%
I-5/SR 16 WBNV I/C	$205.0	$18.75	9.1%
I-5 Grand Mound	$92.1	$18.35	19.9%
US 290 Starr Rd.	$0.2	$0.01	4.6%
SR 270 Pullman to Idaho	$30.4	$3.47	11.4%
SR 24 – SR 241 Cold Crk.	$3.4	$0.22	6.4%
US 12 Frenchtown	$56.6	$2.58	4.6%
SR 539 Ten Mile Rd.	$93.9	$22.27	23.7%
SR 522 UW/Cascadia CC	$49.0	$5.49	11.2%
SR 518 SeaTac Airport	$40.4	$13.97	34.6%
I-5/SR 502 I/C	$51.7	$11.67	22.6%
SR 500/I-205 I/C	$0.6	$0.08	12.4%
US2/97 Peashastin I/C	$21.1	$3.67	17.4%
US2/97 Wenatchee Trail	$1.7	$0.12	7.3%
Totals	**$670.2**	**$105.24**	

Table 7. 2006 project and mitigation cost summary – Costs shown in millions of dollars

2006 Case Studies	Total Project Cost in Millions	Total Mitigation Costs in Millions	% of Project Cost Spent on Mitigation
US 12 Walla Walla	$10.3	$0.2	1.0%
SR 270 Pullman	$29.9	$3.0	10.0%
I-5 HOV Tukwila	$38.7	$2.7	7.0%
SR 16 HOV	$72.0	$9.5	13.1%
I-5 HOV Tacoma	$107.6	$8.3	7.7%
I-405 Kirkland	$163.7	$34.9	21.0%
I-5 Everett HOV	$219.2	$53.5	24.4%
Totals	**$641.4**	**$112.1**	

Table 8. 2003 project and mitigation cost summary – Costs shown in millions of dollars

2003 Case Studies	Total Project Cost in Millions	Total Mitigation Costs in Millions	% of Project Cost Spent on Mitigation
US 2/20/153 NC WA	$0.28	$0.06	20%
SR 20 Tonasket	$4.32	$0.28	6%
I-5 Lacey	$7.96	$0.29	4%
US 395 Tri-Cities	$10.92	$1.16	10%
I-5 Tumwater	$11.22	$1.66	15%
US 12 Walla Walla	$10.20	$3.03	30%
SR 510 Lacey	$16.06	$2.26	14%
I-90 Spokane	$16.20	$1.96	12%
SR 14 Vancouver	$19.78	$0.43	2%
I-90 Spokane East	$36.12	$3.54	10%
SR 18 Maple Valley	$37.67	$7.84	21%
SR 202 Redmond	$61.83	$15.17	24%
I-90 Issaquah	$112.80	$13.80	12%
SR 18 Hobart	$82.08	$27.93	34%
Totals	**$427.44**	**$79.41**	

Case Study Comparison Summary

Table 9. Comparison of all four studies: Ranges of project/mitigation costs and percentage of project costs spent on mitigation

Case Study Year	Range of Project Costs in millions	Range of Total Mitigation Costs in millions	Range of % Spent on Project Mitigation
2013	$0.81 to $60.4	$0.01 to $8.4	1% to 45%
2009	$0.25 to $205.0	$0.01 to $22.3	5% to 35%
2006	$10.3 to $219.2	$0.2 to $53.5	1% to 24%
2003	$0.28 to $112.8	$0.06 to $27.9	2% to 34%

The above table shows the range of costs and percentages of mitigation between study years.

- The first study, conducted in 2003, included fourteen projects consisting of rural and medium- to large-sized urban mobility projects.
- The second study was conducted in 2006 using seven projects, primarily consisting of large urban mobility-type projects.
- The 2009 study concentrated on a balance of project types and sizes across the state. Fourteen projects were included in that study.
- The 2013 study examines eleven projects from across the state. The projects are a mix of small to large projects and a range of project types.

Case Study Comparison: All Mitigation

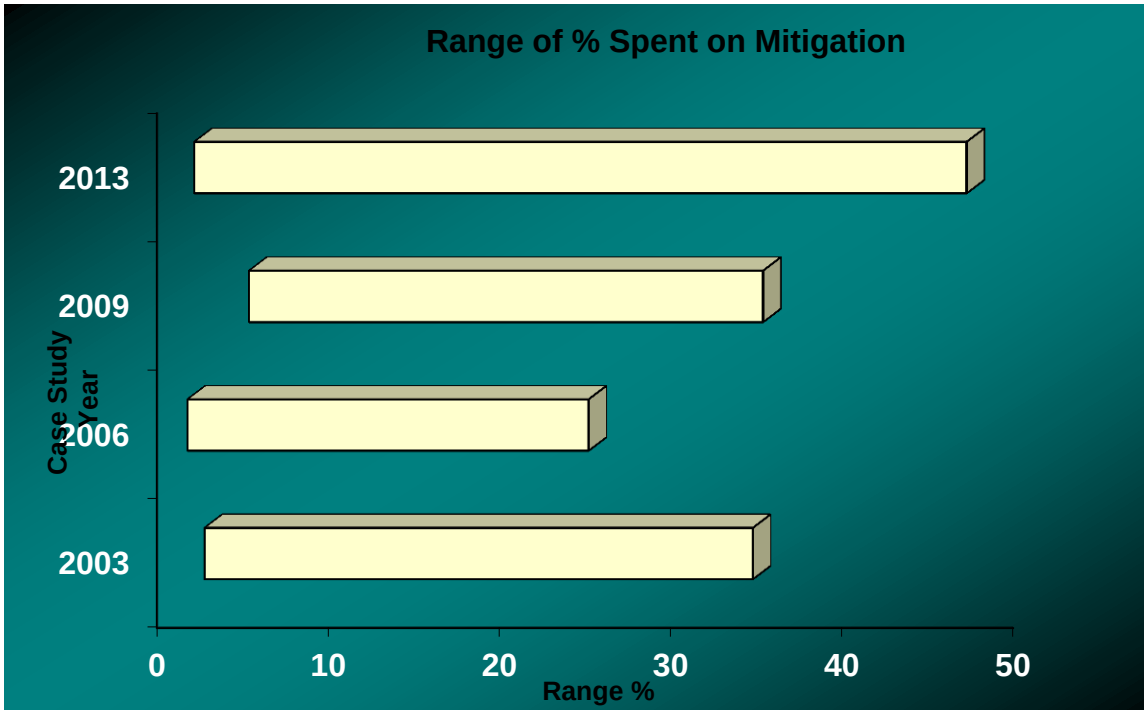


Figure 36. Range of percentage of costs spent on all mitigation for all 4 studies

Case Study Comparison: Stormwater Mitigation Only

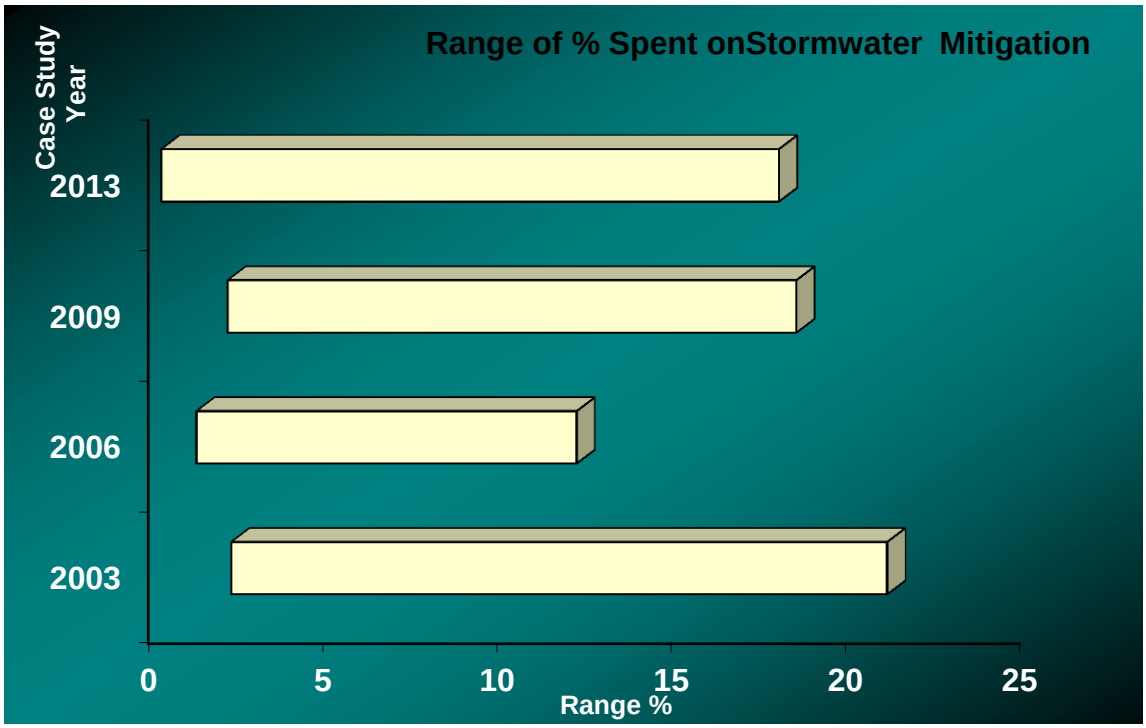


Figure 37. Range of percentage of costs spent on stormwater mitigation for all 4 studies

Case Study Comparison: Wetland Mitigation Only

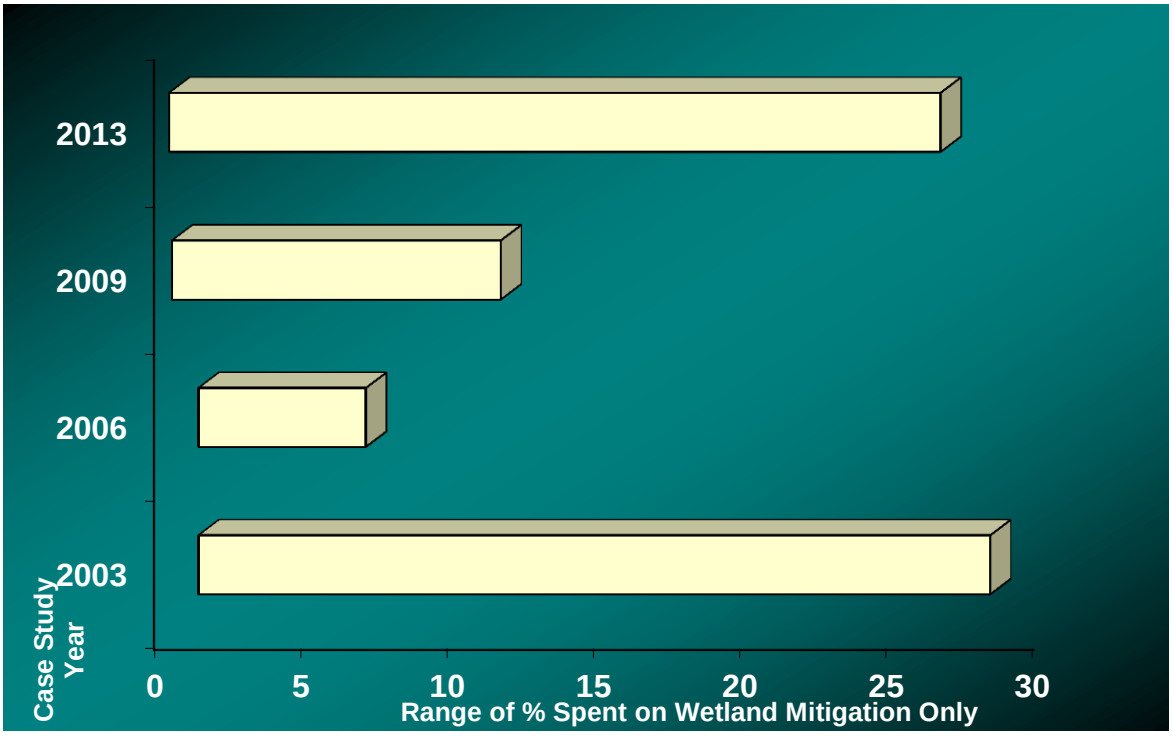


Figure 38. Range of percentage of costs spent on wetland mitigation for all 4 studies

Case Study Comparison: Noise Mitigation Only

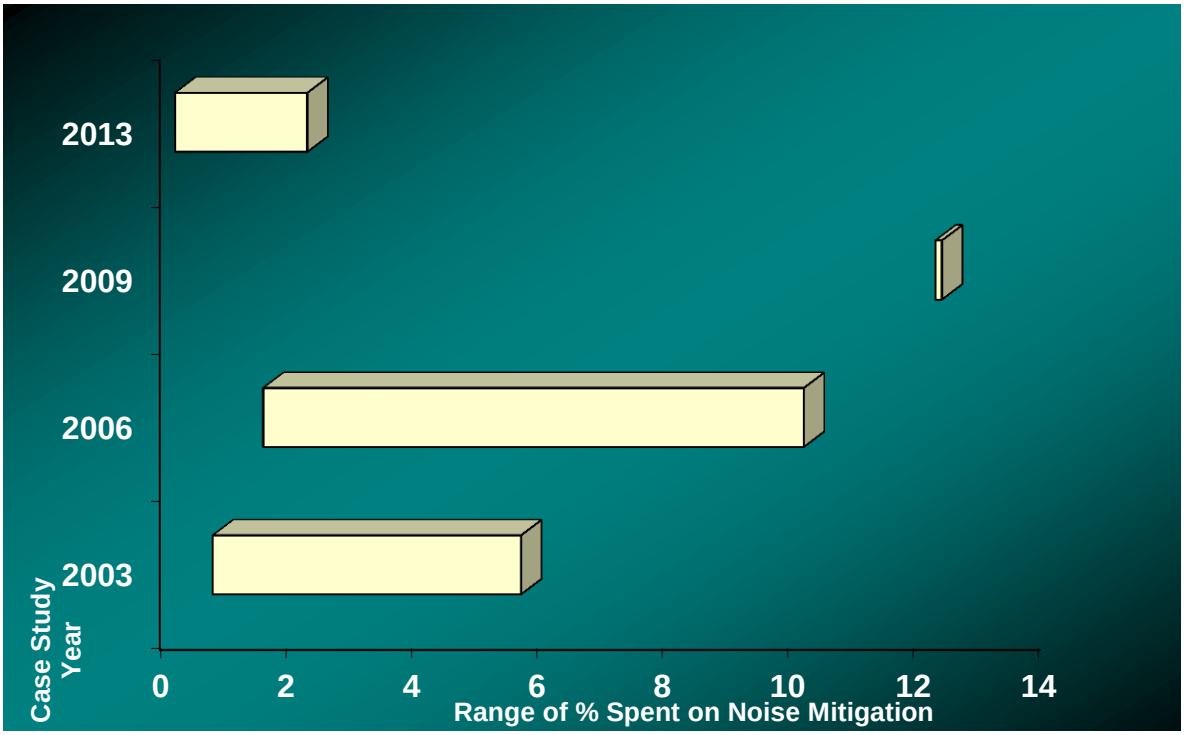


Figure 39. Range of percentage of costs spent on noise mitigation for all 4 studies

Case Study Comparison: Stream Mitigation Only

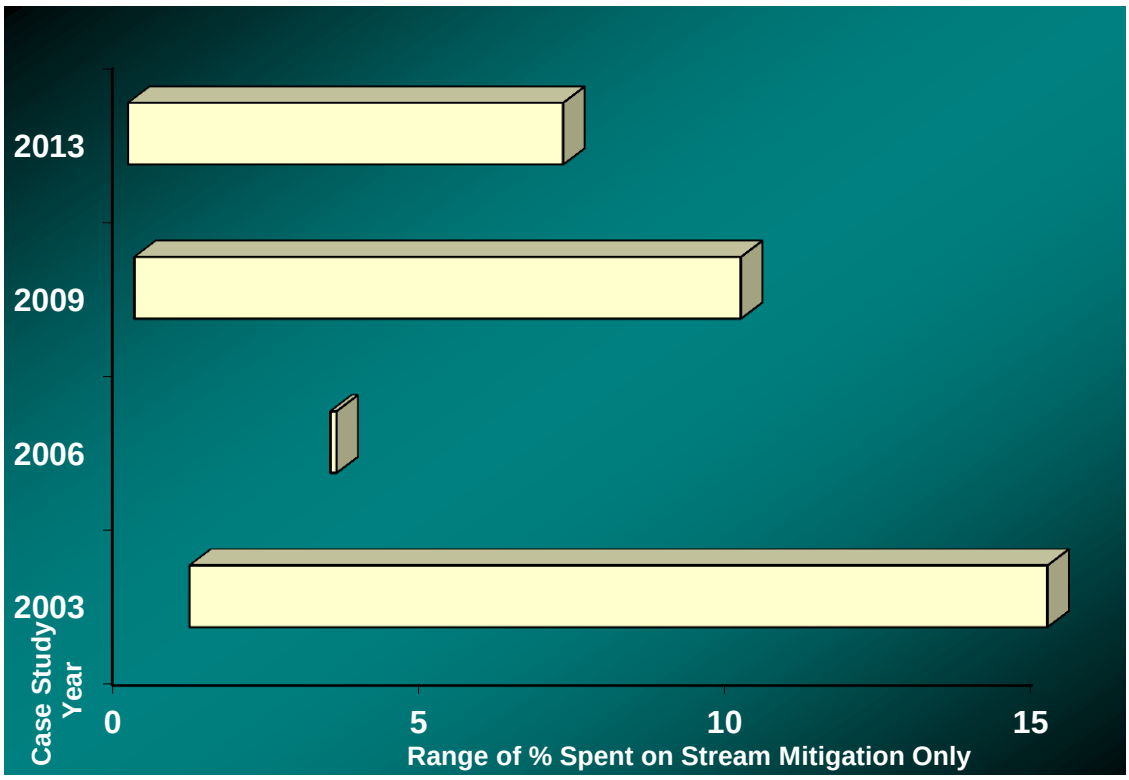


Figure 40. Range of percentage of costs spent on stream mitigation for all 4 studies

Case Study Comparison: All Project Costs

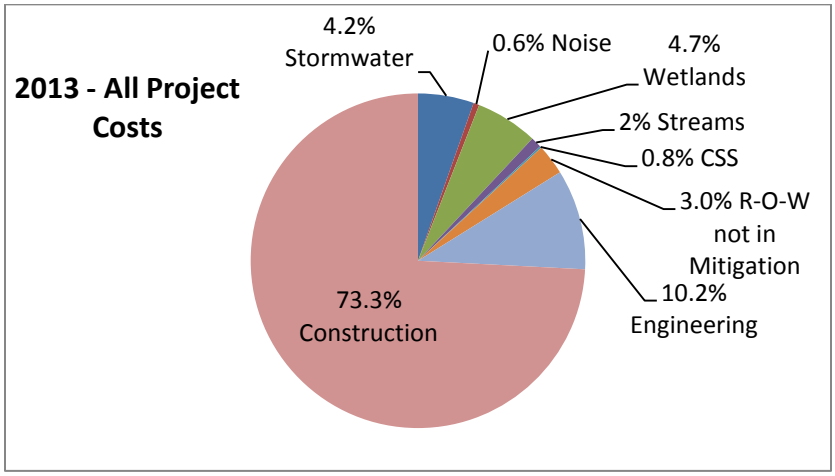


Figure 41. 2013 case studies; mixture of urban and rural projects

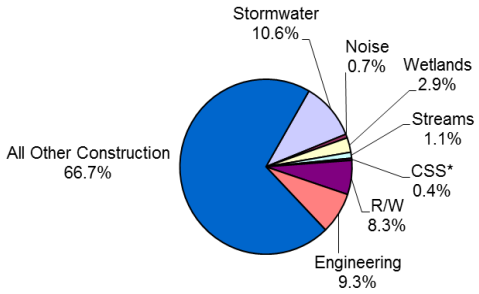


Figure 42. 2009 case studies: balance of urban and rural projects

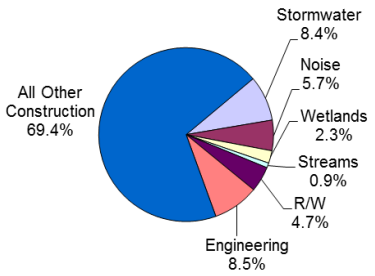


Figure 43. 2006 case studies: mostly urban mobility projects

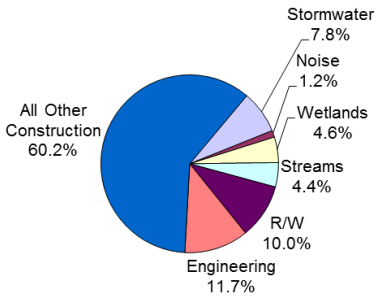


Figure 44. 2003 case studies: balance of urban and rural projects

Case Study Comparison: Mitigation Costs Only

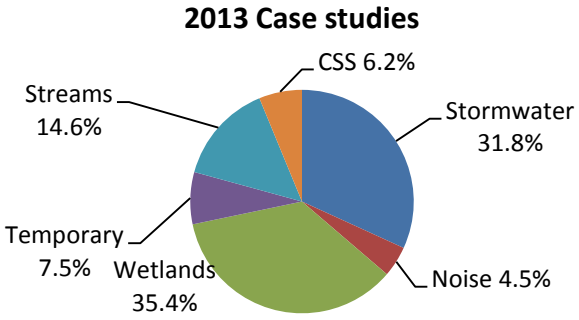


Figure 45. 2013 case studies: a mixture of urban and rural projects

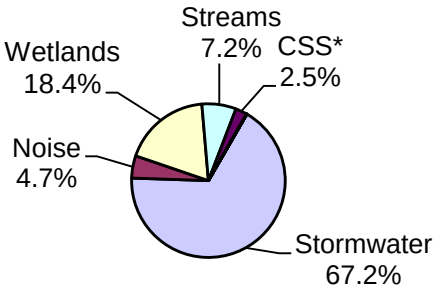


Figure 46. 2009 case studies: a balance of urban and rural projects

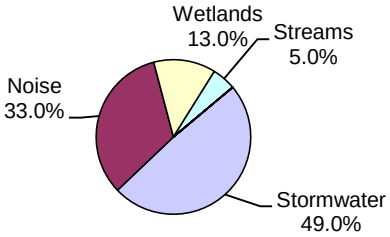


Figure 47. 2006 case studies: mostly urban mobility projects

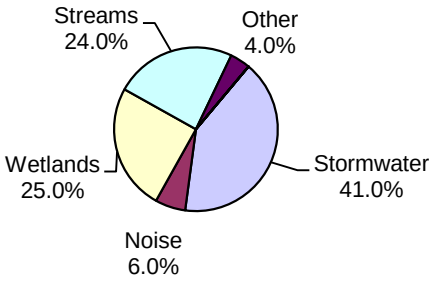


Figure 48. 2003 case studies: a balance of urban and rural projects

Observations and Conclusions

As expected, the total percent of the project costs spent on mitigation varies greatly with the project type, location, and existing built and natural environments.

One of the interesting findings from this study is how much temporary mitigation efforts contribute to the overall cost, for stormwater in particular. Temporary mitigation primarily pertains to stormwater management during construction, although there are other mitigation categories that include temporary items such as temporary walls to prevent a stream impact. Overall, temporary mitigation accounted for 1% of the total project costs spent on mitigation and 20% of the total stormwater mitigation costs.

For studies conducted in 2003, 2006, and 2009, stormwater mitigation had the highest level of investment. In 2003, stormwater accounted for over 40% of the mitigation costs. In 2006, it was nearly 50%, and in 2009 it accounted for nearly 70%. However, in this study, stormwater costs were 33% of the mitigation costs while wetlands accounted for 46%. When we look at stormwater costs with respect to percent of the total project costs for each study year, we see a similar result. Stormwater costs were 7.8%, 8.4%, 10.7%, and 4.4% of the total project costs for the 2003, 2006, 2009, and 2013 studies, respectively. These results are somewhat inconclusive due to the different types of projects selected for this study compared to past studies. In this study, we selected several smaller projects and many that were outside of urban environments. However, in comparing the range of percentages spent on stormwater, it also shows an increase between study years 2003 and 2009. These two study years used a similar approach to project selection. The study conducted in 2006 shows a reduced range compared to 2003 and 2009, which is primarily due to the projects selected for the 2006 study that consisted of a mix of small rural preservation projects to medium to large size mobility projects. Likewise, 2013 shows a reduction in the stormwater costs compared to the other years. The reason for this is likely because three projects out of the eleven had zero or very little stormwater costs due to the nature of the projects. It appears that stormwater mitigation costs rose between 2003 and 2009. The dip in stormwater costs in 2013 is likely due to the project mix selection rather than an indication that stormwater costs are declining.

Besides stormwater, the other mitigation categories showed no clear trend or pattern from the four studies conducted. This is believed to be related to the inherent variability of a given project type and location, as well as the limited number of projects that included a particular type of mitigation. Drawing firm conclusions is difficult because the sample size for each of the studies is small in relation to the total number of projects the agency delivers.

The general consensus with all four studies conducted is that projects west of the Cascades typically have higher levels of mitigation and related costs. As shown in the “All Mitigation” cross-state comparison, the range of percent spent on mitigation is significantly higher on the west side. The primary drivers for the higher costs are the projects’ proximity to streams, wetlands, and neighborhoods and a higher general cost for construction services and real estate.

The right of way costs associated with mitigation for this study accounted for $6.4 million. If you include the purchase of wetland bank credits and stormwater fees paid in lieu of building facilities, it is nearly $7.3 million. Right of way costs associated with mitigation can be a significant cost to a project. Where there were opportunities, the project teams implemented unique and creative solutions in order to reduce these costs. Regardless, the associated right of way costs are 21% of the total amount spent on mitigation for this study.

Appendix A – Environmental Review and Permit List

STORMWATER IMPACTS

Why do we mitigate for stormwater impacts?

Increases in paved surfaces from roadway construction generate stormwater discharges that can contribute to changes in stream flow, stream temperature, water quality, and aquifer recharge. This is because the pavement prevents infiltration into the ground and the highway runoff conveys pollutants from the roadway into the environment. Additionally, storm events during construction can cause erosion and degraded water quality. WSDOT's stormwater mitigation activities are aimed at minimizing the effects of new impervious surfaces and erosion and sedimentation on construction sites.

Laws and regulations that govern actions affecting stormwater include the following:

Federal Permits and Review

The Clean Water Act, Section 402, regulates discharges of stormwater. This section, it's implementing regulations, and permits issued thereunder, is the biggest driver of stormwater mitigation for WSDOT. Stormwater that flows from WSDOT construction sites (1 acre or larger) into river systems and wetlands is strictly regulated for erosion control under the National Pollution Discharge Elimination System (NPDES) general permit for construction activities. This permit requires best management practices for erosion control on construction projects. WSDOT also mitigates stormwater discharges from new and existing impervious surfaces under another NPDES permit: the municipal stormwater permit issued to WSDOT in November 2008. Implementation of Section 402 has been delegated by the U.S. Environmental Protection Agency (EPA) to the Washington State Department of Ecology (Ecology). The Ecology-issued NPDES permits require use of the *Highway Runoff Manual* for mitigating construction and post-construction discharges from WSDOT sites and facilities.

The Endangered Species Act (ESA) was passed to protect and ensure the long-term viability of avian, terrestrial, aquatic, and marine species of flora and fauna. The United States Fish and Wildlife Service (USFWS) is tasked with managing avian, terrestrial, and aquatic species, while the National Oceanic and Atmospheric Administration Fisheries Service (NOAA) is tasked with managing marine species. The listed species most notable to WSDOT with respect to stormwater are bull trout and salmon. Every project with a federal nexus (funding, permit, etc.) proposed by the department must be reviewed for compliance with the ESA. Stormwater impacts to water bodies that function as habitat for ESA species is one of the effects considered in an ESA review, which is referred to in the law as a "consultation." Some projects must complete a Biological Assessment and enter into informal or formal consultation with the USFWS and NOAA (one or both depending upon the species potentially affected by the project). Projects in the consultation process must receive concurrence in the form of a concurrence letter for an informal consultation or a Biological Opinion for a formal consultation, prior to construction.

The Endangered Species Act *does not require* a project to mitigate for impacts nor prescribe a specific method of mitigation; however, if a finding of jeopardy is made for a species, or a finding of adverse modification is made for critical habitat, the project may not move forward.

The Clean Water Act, Section 401, certifies that discharges of dredged or fill materials and other material into waters of the state will not violate state water quality standards when the discharge is regulated by a Section 10 or 404 permit issued by the United States Army Corps of Engineers. If stormwater impacts occur to waters of the state through a 404-permitted activity, and the impact is not regulated by a Section 402 permit (see above), Ecology is required to certify that the project will be in compliance with the state aquatic protection laws through issuance of the §401 Water Quality Certification. Under an Executive Order, the Governor has delegated authority for Section 401 to Ecology.

The National Environmental Policy Act (NEPA) applies to all projects that either receive federal funding or are required to obtain federal permits. Potential impacts and mitigation strategies are identified through Environmental Impact Statements (EIS), Environmental Assessments (EA), or a Documented Categorical Exclusion (DCE). NEPA documents are developed in conjunction with a federal lead agency, typically the Federal Highway Administration, for WSDOT's transportation projects. Compliance with NPDES stormwater permits and use of the *Highway Runoff Manual* is generally presumed to meet NEPA requirements for mitigation of environmental impacts from stormwater.

State Permits and Review

The State Environmental Policy Act (SEPA) requires review of potential impacts to stormwater and identification of mitigation opportunities. WSDOT is the lead agency for its projects under SEPA. All agencies with expertise are expected to review documents created by the lead agency. The SEPA administrative code is adopted and updated by Ecology. Compliance with NPDES stormwater permits and use of the *Highway Runoff Manual* is generally presumed to meet SEPA requirements for mitigation of environmental impacts from stormwater.

The State's Water Pollution Control Act (Chapter 90.48 RCW): Requires the use of all known, available, and reasonable methods of prevention, control, and treatment to prevent the pollution of Washington State's waters; requires waste discharge permits prior to discharging waste materials into waters of the state and requires Ecology to investigate proposed discharges to determine whether the discharge will pollute state waters in violation of state policy; and authorizes Ecology to assume delegation of the federal NPDES permit program. Ecology's NPDES permits address the requirements of both the state Water Pollution Control Act and the federal Clean Water Act.

Hydraulic Project Approvals. Chapter 77.55 RCW governs construction projects in state waters and requires the department to get a Hydraulic Project Approval (HPA) from the Department of Fish and Wildlife (WDFW) for all work in state waters. The purpose of this permit is to ensure the state's aquatic species are not unduly harmed. For stormwater, HPAs regulate only the construction of stormwater facilities below the Ordinary High Water Level of state waters, not the type of best management practice, nor the quality or quantity of the stormwater discharge.

Local Permits and Review

In most instances, local stormwater management standards will not override the requirements in the *Highway Runoff Manual*. RCW 47.01.260(1) grants WSDOT plenary power in planning, locating, designing, constructing, improving, repairing, operating, and maintaining state highways, including drainage facilities and channel changes necessary for the protection of such highways. This grant of authority means that, absent express legislative direction, WSDOT is not subject to local regulations in areas within WSDOT's purview. The following are major local/area-specific requirements that WSDOT will comply with where applicable.

The State Shoreline Management Act (SMA) (Chapter 90.58 RCW) requires local governments to develop "shoreline master programs" that regulate development in shoreline areas adjacent to rivers and larger streams, lakes larger than 20 acres, and marine waterfronts. These local programs include both plans and regulations for achieving the level of protection of shorelines based on state guidelines, but tailored to meet specific community needs. The plans are a comprehensive vision of how shoreline areas will be used and developed over time. Regulations are the standards that shoreline projects and uses must meet. WSDOT's compliance with SMA rules and the conditions of local shoreline master programs is achieved during the project planning and design phase and through submittal of the required permit applications. Typically, compliance with the *Highway Runoff Manual* will address concerns relative to stormwater in shoreline areas.

The State Growth Management Act Critical Area Regulations (Chapter 36.78 RCW and Chapter 365-195 WAC) require all local governments to adopt and enforce *critical areas ordinances* and, more recently, to meld these with SMA requirements. Critical area ordinances are a set of development regulations that protect wetlands, stream corridors, fish and wildlife habitat, potable water groundwater recharge areas, flood plains, and geologic hazard areas. If a project is located within a designated critical area, WSDOT's compliance with critical area ordinances is achieved during the project planning and design phase through submittal of the required permit applications and negotiations in project design and mitigation measures. Typically, compliance with the *Highway Runoff Manual* will address concerns relative to stormwater in critical areas.

Tribal Government Review

Federal treaties between sovereign tribal nations and the federal government require WSDOT to maintain government-to-government relations with 29 federally recognized tribes. This covers cultural, environmental, and economic rights of the tribes related to aquatic species and habitat. The EPA issues NPDES permits on tribal lands.

NOISE IMPACTS

Why do we mitigate for noise impacts?

Construction and traffic noise is a nuisance to both humans and wildlife. Noise can affect human sleeping habits and outdoor recreation. Breeding, foraging, and nesting habits in wildlife can be impacted by construction noise. Local ordinances aim to diminish the effect of short-term construction noise, while the Federal Highway Administration (FHWA) regulates traffic noise.

Laws and regulations that govern actions affecting noise include the following:

Local Permits and Review

Local ordinances that govern noise are limited to nighttime construction activities and vary greatly from jurisdiction to jurisdiction. These ordinances may prohibit certain activities such as pile driving or jack-hammering during certain hours of the day. WSDOT often receives variances from these ordinances. Local governments do not regulate chronic traffic noise, and daytime construction activities are exempt.

State Permits and Review

The State Environmental Policy Act (SEPA) requires that all major actions sponsored, funded, permitted, or approved by state and/or local agencies undergo planning to ensure environmental considerations are given due weight in decision making. SEPA documents identify potential impacts due to noise as well as abatement opportunities. WSDOT is the lead agency for its projects under SEPA. All agencies with expertise are expected to review documents created by the lead agency. The SEPA administrative code is adopted and updated by the Washington State Department of Ecology (Ecology).

WSDOT Department Directive D22-22 and the Priority Study (1985) outline the criteria for conducting a noise inventory for existing state highways and establishment of noise priority sites for traffic noise abatement.

Federal Permits and Review

The National Environmental Policy Act (NEPA) applies to all projects that either receive federal funding or are required to obtain federal permits. Potential impacts and mitigation strategies are identified through Environmental Impact Statements (EIS), Environmental Assessments (EA), or a Documented Categorical Exclusion (DCE). NEPA documents are developed in conjunction with a federal lead agency, typically FHWA, for WSDOT's transportation projects.

FHWA Noise Standards, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, requires a traffic noise analysis for federally funded projects that (1) involve construction of a new highway, (2) significantly change the horizontal or vertical alignment, or (3) increase the number of through traffic lanes on an existing highway. When federal funds are used in project construction, FHWA noise abatement standards must be met. When state, county or city-only funds are used, WSDOT noise policy standards must be met.

The Endangered Species Act (ESA) was passed to protect and ensure the long-term viability of avian, terrestrial, aquatic, and marine species of flora and fauna. Highway construction operations can have harmful effects on listed species, including interruption of foraging, breeding, and nesting activities. Each project that receives federal funding must undergo ESA review. Some projects must prepare a Biological Assessment and enter into formal or informal consultation with the Services. Projects that have entered formal consultation must obtain a Biological Opinion, while projects that have entered informal consultation must obtain a concurrence letter. In both cases, concurrence must be obtained prior to construction. The Endangered Species Act does not require a project to mitigate for impacts; however, if a finding of jeopardy is made for a species or a finding of adverse modification is made for critical habitat, the project may not move forward.

WETLAND IMPACTS

Why do we mitigate for wetland impacts?

Wetlands perform a broad variety of critical functions for our ecological systems, including improving water quality, stabilizing stream flows, providing storage for flood waters, providing rearing areas for juvenile salmon, creating rest stops for migratory waterfowl, and providing essential forage, breeding, and nesting areas for a host of species.

Laws and regulations that govern actions affecting wetland habitats include the following:

Local Permits and Review

The Revised Code of Washington (RCW) 47.01.260(1) grants WSDOT plenary power in planning, locating, designing, constructing, improving, repairing, operating, and maintaining state highways, including drainage facilities and channel changes necessary for the protection of such highways. This grant of authority means that, absent express legislative direction, WSDOT is not subject to local regulations in areas within WSDOT's purview.

The State Shoreline Management Act (Chapter 90.58 RCW) tasks local governments with establishing shorelines of statewide significance and with creating overall development plans for all shorelines. The Shoreline Management Act (SMA) explicitly includes wetlands associated with regulated shorelines. Any WSDOT project that impacts a wetland that is associated with a regulated shoreline is then subject to regulation under the SMA. Each county is empowered to enforce elements of the SMA.

The State Growth Management Act (Chapter 36.78 RCW and Chapter 365-195 WAC), combined with Article 11 of the Washington State Constitution, mandates that local jurisdictions adopt ordinances that classify, designate, and regulate land use in order to protect critical areas. Critical areas include wetlands and their buffers, among others. These areas are regulated through local critical/sensitive areas ordinances. WSDOT must gain local government approval under the Growth Management Act whenever wetlands are impacted. The requirements of these ordinances vary widely from jurisdiction to jurisdiction.

State Permits and Review

The State Environmental Policy Act (SEPA) requires that all major actions sponsored, funded, permitted, or approved by state and/or local agencies undergo planning to ensure environmental considerations, such as impacts on wetlands, are given due weight in decision making. WSDOT is the lead agency for its projects under SEPA. Potential impacts and mitigation strategies are identified in the SEPA documents. All agencies with expertise are expected to review documents created by the lead agency. The SEPA administrative code is adopted and updated by the Washington State Department of Ecology (Ecology).

The State Water Pollution Control Act (Chapter 90.48 RCW) is the primary water pollution law protecting state waters, including wetlands. The state's water quality standards, Chapter 173-201(A) WAC, specifically require that the beneficial uses of wetlands be protected. Ecology has authority under the Act to issue administrative orders to protect waters of the state not covered by federal laws, such as isolated wetlands. Ecology is mandated to enforce compliance with the State Water Pollution Control Act and require mitigation for wetland impacts in order to replace lost functions due to the permitted impacts.

Hydraulic Project Approvals. The Hydraulic Code, Chapter 77.55 RCW, governs construction projects in state waters and requires WSDOT to get a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW) for all work in state waters, including wetlands that contain fish habitat. Chapter 220.110 WAC expands on this goal by including all work that may impact state waters. The purpose of this permit is to ensure the state's aquatic species are not unduly harmed. WDFW issues Hydraulic Project Approvals.

Federal Permits and Review

The National Environmental Policy Act (NEPA) requires that all major actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure environmental considerations, such as impacts to wetlands, are given due weight in decision making. Potential impacts and mitigation strategies are identified through Environmental Impact Statements (EIS), Environmental Assessments (EA), or a Documented Categorical Exclusion (DCE). NEPA documents are developed in conjunction with a federal lead agency, typically the Federal Highway Administration, for WSDOT's transportation projects.

The Endangered Species Act (ESA). The goals of ESA include species conservation, ecosystem conservation, and species recovery. Regulations pertaining to wetlands overlap with ESA requirements because wetlands can be habitat for federally listed plants and animals.

The Clean Water Act (33 USC § 1251 et seq.), formerly known as the Federal Water Pollution Control Act, provides comprehensive federal regulation for all sources of water pollution. It prohibits discharge of pollution from non-permitted sources.

Section 404 of the Act regulates the discharge of dredged or fill materials into waters of the United States, including wetlands. Section 404 is jointly administered by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers (Corps). The Corps issues permits for activities that discharge dredged or fill materials to waters of the U.S., including wetlands. In order to obtain a Corps permit for a project that impacts wetlands, WSDOT identifies how it will avoid, minimize, and/or compensate for any loss to wetland acreage or function.

Section 401 requires that federally permitted activities comply with the federal Clean Water Act, state water quality standards, and any other appropriate state laws (such as the Water Resources Act and Hydraulic Code). Ecology implements Section 401 requirements and issues water quality certifications on projects that require a Corps Section 404 Permit. When WSDOT needs a Section 401 water quality certification for a project that impacts wetlands, WSDOT identifies how it will avoid, minimize, and/or compensate for any loss to wetland acreage or function.

The Rivers and Harbors Act (33 USC § 403). Section 10 of the Rivers and Harbors Act requires Corps authorization for structures or work in, over, or affecting navigable waters of the United States.

The Coastal Zone Management Act requires protection of coast natural resources such as shellfish and salmon, as well as the broader ecological and geological functions of coastal areas. This act includes wetlands within Washington's 15 coastal counties. The Coastal Zone Management Act requires states that want to receive federal funding for coastal resource protection to develop a Coastal Zone Management Program. The National Oceanic and Atmospheric Administration Office of Ocean and Coastal Resource Management has approved Ecology's Program.

Tribal Government Review

Federal treaties between sovereign tribal nations and the federal government require WSDOT to maintain government-to-government relations with 29 federally recognized tribes. This covers the cultural, environmental, and economic rights of the tribes related to aquatic species and habitat.

Executive Orders and Agency Directives

Protection of Wetlands, Presidential Executive Order 11990, requires federal agencies to minimize the loss or degradation of wetlands and enhance their natural value. WSDOT projects with federal funding are subject to this order.

Preservation of the Nation's Wetlands, U.S. Department of Transportation Order DOT 5660.1A, describes U.S. Department of Transportation policy that states transportation facilities and projects should be planned, constructed, and operated to ensure the protection, preservation, and enhancement of the nation's wetlands to the fullest extent practicable. The order establishes procedures for implementation of this policy.

Protection of Wetlands, Governor's Executive Order 89-10, commits state agencies to no overall net loss to wetlands, and to the encouragement of sensitive site design and planning on a watershed basis to avoid or minimize damage to wetlands. The order designates Ecology to provide guidance on wetland issues, and instructs each affected state agency to develop an action plan to lessen the loss of wetlands and to preserve or enhance the value of wetlands.

Protection of Wetlands, Governor's Executive Order 90-04, is more comprehensive than Executive Order 89-10, and requires all state agencies to rigorously enforce their existing authorities to ensure wetlands protection. State agencies are required to promote and support mitigation in the order of decreasing preference, from avoidance to compensatory mitigation.

Washington State Department of Transportation Directive D31-12, Protection of Wetlands Action Plan, establishes policy and guidance for the protection and preservation of wetlands. The Directive was developed to ensure no overall net loss of wetlands is caused by department actions, and to increase the quantity and quality of wetlands in the long term.

STREAM IMPACTS

Why do we mitigate for stream impacts?

Streams are vital to the environment, providing both critical habitat and a mechanism for conveyance of water. Impacts on one part of a stream may affect an entire watershed system. Consequently, maintaining the health of streams is essential to providing a healthy environment.

Laws and regulations that govern actions affecting riparian habitats include the following:

Local Permits and Review

The Revised Code of Washington (RCW) 47.01.260(1) grants WSDOT plenary power in planning, locating, designing, constructing, improving, repairing, operating, and maintaining state highways, including drainage facilities and channel changes necessary for the protection of such highways. This grant of authority means that, absent express legislative direction, WSDOT is not subject to local regulations in areas within WSDOT's purview.

The Shoreline Management Act (Chapter 90.58 RCW) tasks local governments with establishing shorelines of statewide significance and with creating overall development plans for all shorelines. Whenever WSDOT has a construction project in a river, it is required to get a permit from the appropriate local jurisdiction to ensure that shoreline protection requirements are met and that the development is compatible with the local plan.

The State Growth Management Act (Chapter 36.78 RCW and Chapter 365-195 WAC) requires applicable local governments to establish Critical Area Ordinances for the protection of critical habitats and species. Many riparian areas are included in local Critical Area Ordinances.

State Permits and Review

Hydraulic Project Approvals. Chapter 77.55 RCW governs construction projects in state waters and requires the department to get a Hydraulic Project Approval (HPA) from the Department of Fish and Wildlife (WDFW) for all work in state waters. Chapter 220.110 WAC expands on this goal by including all work that may impact state waters. The purpose of this permit is to ensure the state's aquatic species are not unduly harmed. In order to obtain an HPA from WDFW on a project that uses, diverts, obstructs, or changes the natural flow or bed of any of the salt or fresh waters of state, WSDOT identifies how it will avoid, minimize, and/or compensate for those impacts.

Federal Permits and Review

The National Environmental Policy Act (NEPA) applies to all projects that either receive federal funding or are required to obtain federal permits. Potential impacts and mitigation strategies are identified through Environmental Impact Statements (EIS), Environmental Assessments (EA), or a Documented Categorical Exclusion (DCE). NEPA documents are developed in conjunction with a federal lead agency, typically the Federal Highway Administration, for WSDOT's transportation projects.

The Endangered Species Act (ESA). The goals of ESA include species conservation, ecosystem conservation, and species recovery. Regulations pertaining to streams overlap with ESA requirements because streams can be habitat for federally listed plants and animals.

The Clean Water Act, Section 401, regulates discharge into waters. If rivers are to be filled or discharge is made into a river, a permit is required under Section 401. Such a permit may require mitigation of impacts as part of the permit approval. Under an Executive Order, the Governor has delegated authority for Section 401 to the Washington State Department of Ecology (Ecology).

The Clean Water Act, Section 402, regulates discharge of stormwater. Stormwater that flows from WSDOT construction sites into river systems is strictly regulated for erosion control under a National Pollution Discharge Elimination System permit. This permit establishes best management practices for erosion control on construction projects. Enforcement of Section 402 has been delegated by the Environmental Protection Agency to Ecology.

The Clean Water Act, Section 404, regulates dredging and fill materials in waters, including rivers. Section 404 permits are granted through the United States Army Corps of Engineers.

The Rivers and Harbors Act, Section 10, regulates all navigable waters. Permit approvals must be secured to ensure no obstructions to navigable waters occur. This is applicable to many WSDOT bridge construction activities. Section 10 permits are granted through the United States Army Corps of Engineers.

The Coastal Zone Management Act requires protection of coast natural resources such as shellfish and salmon, as well as the broader ecological and geological functions of coastal areas. The Coastal Zone Management Act requires states that want to receive federal funding for coastal resource protection to develop a Coastal Zone Management Program. The National Oceanic and Atmospheric Administration Office of Ocean and Coastal Resource Management has approved Ecology's Program.

Tribal Government Review

Federal treaties between sovereign tribal nations and the federal government require WSDOT to maintain government-to-government relations with 29 federally recognized tribes. This covers the cultural, environmental, and economic rights of the tribes related to aquatic species and habitat.